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EDITOR'S notes

I'll always remember my college days as a special time of learning and freedom. They are an increasingly distant memory, but I'm still sometimes pleasantly carried back in time by a song, a book title, or a film clip from the 1968–1972 era. As it usually goes with nostalgic relapses, one memory triggers another. One recent association led to my recall of a question asked by students away from home for the first time, immersed in their first philosophy course: *What is truth?*

The trouble with totally absorbing yourself in this great riddle, I found out quickly, is that life goes on without the slightest regard for the sincerity of your deepest meditations. You soon discover, for example, that your stomach is growling, you're out of food, you need gas in the car to get to the grocery store, and so on. In a short time, with an adjusted perspective, the great question becomes trite and laughable. I remember jaded college seniors laughing at and mocking poor, confused, and beleaguered freshmen who were not quite sure, for the first time in their lives, what was real and what was not.

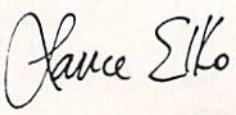
Having been involved in the workaday world of business and publishing for many years now, I feel like I'm light-years away from these postadolescent concerns. In a business, particularly this one, there's no confusion about abstractions. You deal on concrete terms with writers and editors, programmers, software publishers, financial people, advertising people, circulation people, production people, and so on. You deal with good writing and bad writing, good programs and bad programs, and lots and lots of numbers—numbers of pages, readers, renewals, and newsstand copies.

But a closer, more careful look reveals a different scenario. Numbers are absolute, sure. But you have to interpret and weigh them, determine what's significant, and look for trends—a highly subjective exercise. You have to deal with rumors. Is Commodore really dropping the 128? Is there really an Amiga-based videogame machine? Does Commodore really not know how many computers they've sold? On Tuesday, a leading software publisher tells you that the 64 software market has a bright year ahead; on Wednesday, another one says that the market has dried up. Closer to home, one staffer touts the merits of a new program, while another calls it a piece of junk—"Mr. Editor, it's your call."

A few weeks back, I read through a batch of letters from readers who were disillusioned with games. "Please just skip the games—give us more programming utilities," said one letter. Several days later, a different batch of mail brought pleas from several readers for *more* games.

It's been nearly 20 years since I spent any serious time musing over questions of truth, illusion, and reality. With a wife and three kids, a demanding job, and a house with a leaky roof, the illusory and the hypothetical are as accessible as a remote planet in a distant solar system. Lately, though, there's that rare and odd moment when, in the twilight of sleep, the ghosts of questions many years old slip through the day's details. They nip and gently press for a little time. But they don't get it.

My son's first-grade teacher wants him to practice his printing under his parents' watchful eyes. My youngest daughter isn't getting enough of my attention, and I need to call a late columnist first thing in the morning. Then there's that pile of letters to the editor that needs to turn into a column in two days, and I must call around for some roofing estimates. And, finally, there's that last-minute "Editor's Notes" column, which, with a few more keystrokes, I will have finished.



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COMPUTE!'s GAZETTE FOR USERS
COMMODORE 64/128

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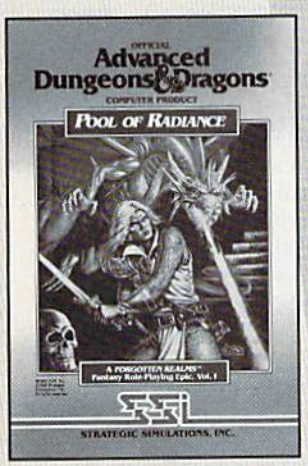

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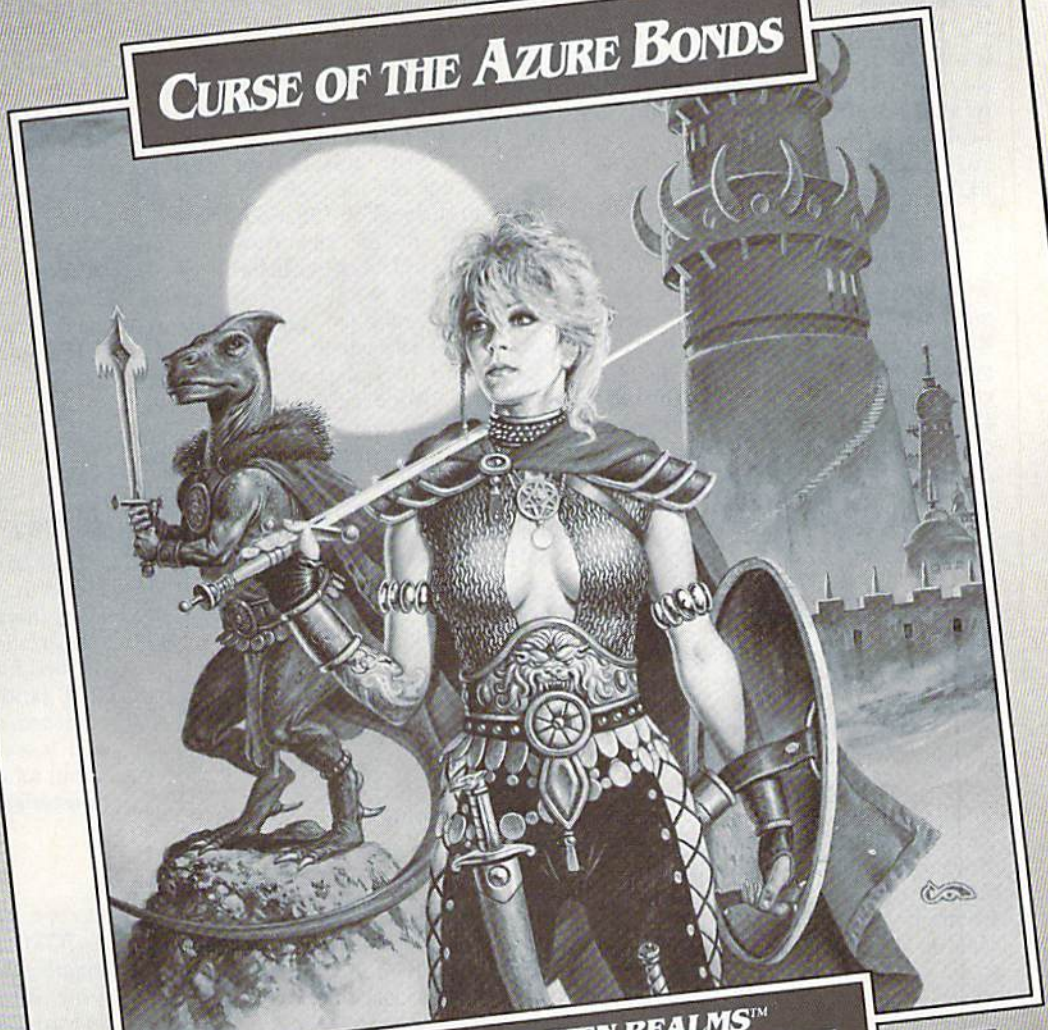

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LETTERS to the editor

Send questions or comments to Letters to the Editor, COMPUTE!*'s Gazette, P.O. Box 5406, Greensboro, North Carolina 27403. We reserve the right to edit letters for clarity and length.*

geoSurprise

I've searched every magazine rack in town and have yet to find the one thing that every GEOS user needs desperately: a GEOS-dedicated publication. After nearly four years of GEOS, I'm very surprised that the people at COMPUTE! have not seen to this need.

Bob Easly
Indianapolis, IN

Sorry, but we pretty much have our hands full with Gazette, COMPUTE!, Amiga Resource, COMPUTE!'s PC, *and the various magazine companion disks. However, there is a publication—and it's a good one—that might meet your needs.* GEOWORLD, *in its second year, is produced using GEOS and is laser-printed. It's available by subscription (12 issues for $20). For more information, write* GEOWORLD, *38 Santa Ynez Street, Santa Barbara, California 93103.*

Learning Lament

G'day down under here! Thanks for your wonderful magazine, which has brought much enjoyment to myself and my children; not so for my wife, though, who is now a golf and computer widow, but I'm working on her.

For some months now, I've noticed that you've not had any educational programs listed. I've found these helpful for my preschool and school-age children. Please let me know if you plan on publishing any in the future.

John Forster
Kellerberrin, Western Australia

In Gazette*'s first couple of years, we published dozens of educational programs—mostly in the areas of math, spelling, and early reading. Over the past two to three years, we've stopped seeing submissions of these kinds of programs. We'd gladly publish some good ones if we had some from which to choose.*

Victims of Sloth

In your March column, you printed a letter from E. Stuart Johnson saying, "Now I know why there are so many 64 programs and so few for the 128. It's a matter of practicality." Practicality? You're kidding! *Laziness* is the real reason! There are more than 2 million 128s in the U.S. alone, and those of us who are dedicated to the 128 are tired of the major software companies and individual programmers ignoring the 128 and its capabilities.

Although some software companies have converted some of their entertainment programs for the 128 (Infocom now makes Commodore games only for the 128; Origin gave music to *Ultima V* in 128 mode), the real reason for lack of 128 software is laziness. The software companies say, "100,000 copies sold!" That number would easily double if they made separate 64 and 128 versions, but they just don't want to spend any more time than they have to on the 128. However, if a new 16-bit computer came out, they would rush their rear ends off making games for that machine.

As for Mr. Johnson and those who feel as he does: Sell your 128 and get a 64! It's obvious you wasted your money on a computer you won't even use!

John Berger
Scranton, PA

File-Copy Solution

I've subscribed to the *Gazette Disk* since 1986. How can I get just one program copied to another disk, for my own use, without copying the whole disk?

Marjorie Webber
Oklahoma City, OK

Since you've subscribed since 1986, you already have a couple of programs that will do the job. In the December 1987 issue, we published "Disk Rapid Transit," which copies any file—BASIC or machine language—at lightning-fast speed on the 64. In the March 1988 issue, we published "ML Cloner," which copies any machine language program. It works on the 128, 64, Plus/4, and 16. Also, if you have a 1571 drive, you can use the file copier found on the companion Test/Demo disk.

Programmers in the Bermuda Triangle?

I wonder how many others have downloaded freeware or shareware from BBSs and sent letters to the addresses given, offering to pay for the docs, only to find the programmer has moved, leaving no forwarding address. This is especially frustrating when the program proves to be very useful and you'd like to get the updates the programmer has offered for a small additional fee. Three fellows our club would especially like to find are Dennis Colombo, author of "Electronic Cottage" (last known address: Orcutt, California); Will Corley, author of "Lynx" (last known address: Sacramento, California); and Mike Apsey, whose name appears at the end of the listing of "64 Morse R/T" (last known address: Van Alstyne, Texas).

Perhaps it's naive of me to think any of them might read this and drop us a line, but I figured it was worth a try.

Pete Baker
Librarian
Marysville-Yuba City HACC
7127 Arrowhead Trail
Browns Valley, CA 95918-9630

All Greek to Me

I'd like to type in "Monthly Calendar," found in your March 1989 issue. However, there are some characters I don't understand, nor do I find them explained in the typing instructions. Line 1010 (and several others) have a letter enclosed in brackets with greater-than and lesser-than symbols typed over them, followed by an underlined string of asterisks.

Barkley Vineyard
Sanibel, FL

In every issue, we include "How to Type In COMPUTE!*'s* Gazette *Programs." It's usually found on the last page of the magazine. We list it in the table of contents, and we spot the program listings section with boxes reminding readers to consult this page before typing in programs. The characters you're having trouble with are noted in the "How to Type" article (page 92 in the March issue). The symbols you're referring to—brackets with greater- and lesser-than symbols—indicate that you should hold down the Commodore key and press the character enclosed in the special brackets. The underlined characters indicate that you should hold down SHIFT and type the character that is underscored—in this case, the asterisk.* G

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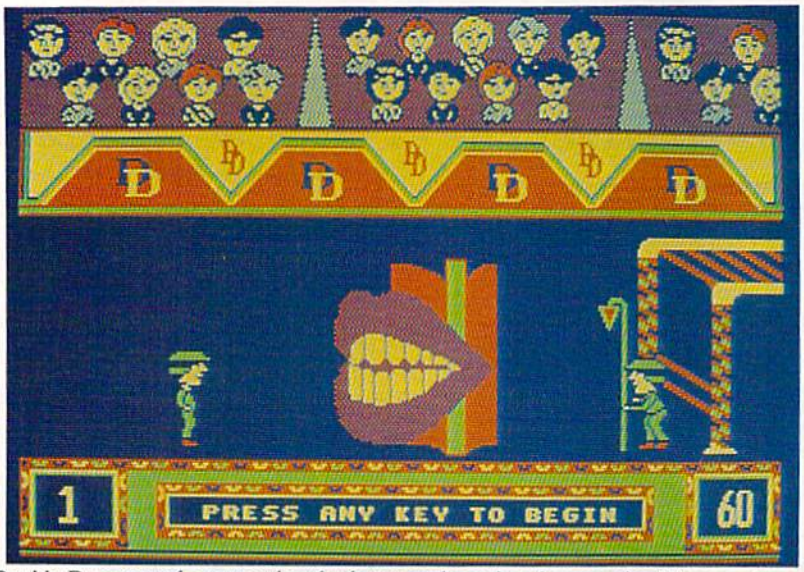
COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Edited by Mickey McLean



Double Dare, *one of a new series of software packages based on popular TV game shows.*

Circle Gets the Square

Have you ever felt you could do better than the game-show contestants the producers had selected? Now you can find out in the privacy of your own home. GameTek (Navarre, 6750 West Broadway, Brooklyn Park, Minnesota 55428) has released computer versions ($14.95 each) of the popular game shows "Hollywood Squares," "Super Password," and "Double Dare!."

Hollywood Squares asks players to second-guess computer celebrities in the popular game of tic-tac-toe. The game comes complete with the show's theme music and wisecrack comments. Two computer contestants can compete head-to-head, or one can play Gametek's expert player, Microkid.

In *Super Password*, one or two players are paired with computer celebrities to give and receive word clues. Players go through the same rounds their television counterparts do, including the $10,000 speed round, where the champion must correctly guess ten words in 90 seconds.

Double Dare, based on the syndicated game show produced by MTV, combines the challenge of answering questions with physical challenges such as launching yourself off a teetertotter to land on a trampoline. Computer players control their onscreen character's ability to jump over, throw, or toss objects.

Long-Distance Larceny

A North Carolina teenager has been charged with using his Commodore 64 and modem to access a long-distance telephone service's computer and acquire customer security codes. With these codes, he allegedly made calls and charged them to other people's bills.

The *Greensboro News & Record* reported that he has been charged with illegally accessing Atlanta-based Southernet USA's South Carolina computer and running up approximately $12,000 in long-distance charges. He allegedly used a program to test a series of random numbers to find customer security codes. It was reported that he was online for more than a week.

Officials seized his computer, printer, modem, and disk drives. The teenager could face up to 12 years in prison.

Low-Cost Educational Software

KIDware (1380 156th NE, Suite H2, Bellevue, Washington 98007) has released 20 new disks containing educational programs for children ages 2–16. Each disk ($11.95) has six menu-driven programs that feature music and graphics.

New for the 128

Herne Data Systems (P.O. Box 714, Station C, Toronto, Ontario, Canada M6J 3S1) and Brown Boxes (26 Concord Road, Bedford, Massachusetts 01730) have announced the release of QDisk version 2.1 ($9.95), a device driver for the Quick Brown Box. A battery-backed CMOS-static RAM cartridge for the 64 and 128, the Quick Brown Box is available in 16K ($69), 32K ($99), and 64K ($129) configurations. The two together allow QDisk to be used as a nonvolatile ramdisk in 128 mode. QDisk is application-transparent and can be used with standard CP/M software.

Jugg'ler-128 ($19.95) has also been released by Herne Data. The program provides read, write, and formatting support for more than 130 types of MFM CP/M disks. Features include menu screens for selecting and installing disk types and formatting new disks, a user-definable set of up to three default disk types, and support under all versions of 128 CP/M for the 1570, 1571, and 1581 drives.

The program also features total support by 128 CP/M DOS commands for the extra disk types without the need for special programming. Users have the ability with *Jugg'ler-128* to analyze an unknown CP/M disk type and report possible matches from its internal database of disk types.

The primary distributor for both QDisk and *Jugg'ler-128* is Poseidon Electronics (103 Waverly Place, New York, New York 10011). Poseidon offers *Jugg'ler-128* for $16 and QDisk for $10. Both prices include postage.

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS

Rolling Along

You'll need your best joystick skills to maneuver a ball through a multi-dimensional puzzle on ten different planes in *Mind-Roll* ($29.95), from Epyx (600 Galveston Drive, P.O. Box 8020, Redwood City, California 94063). Each successive plane increases in difficulty, but you can rearrange the planes in any order for play or practice.

You'll need to walk a plank, hunt for hidden amulets, fill the screen with tiled squares, and roll over puzzle squares in a predetermined sequence. All onscreen activities must be completed before time expires. Plane 7 features time boosters, which give you extra seconds to negotiate obstacle courses, roll down a racetrack, or complete a maze.

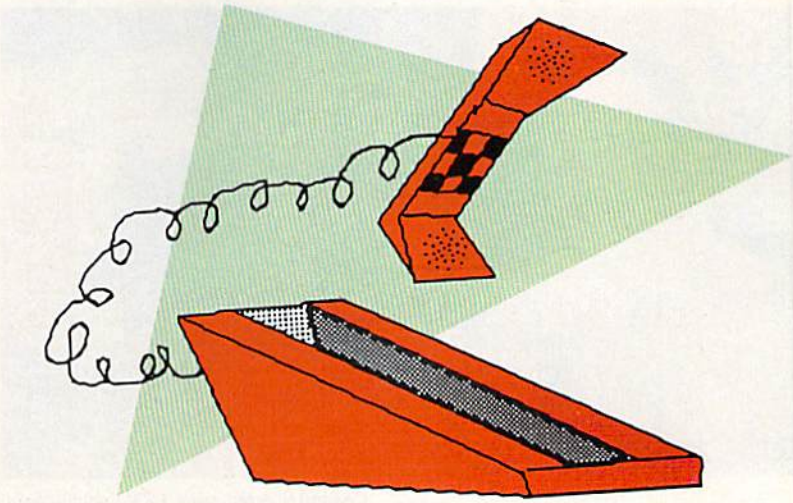
After each plane, any remaining time units are converted into points. You also have the opportunity to improve your score with bonus rounds, which follow each completed plane.

World of Commodore—"California, Here We Come"

The first West Coast edition of the World of Commodore Show runs from May 19 through May 21 in the Los Angeles Convention Center.

The Hunter Group (204 Richmond Street West, Suite 410, Toronto, Ontario, Canada M5V 1V6), which organizes the show in association with Commodore, is working to create a show that features something for everyone. Expected highlights of the three-day event include a variety of new-product announcements, stage presentations, seminars, hands-on browsing, and contests.

The original World of Commodore Show, held annually in Toronto, celebrated its sixth year last December. In November of 1988, the first U.S. World of Commodore Show was held at the Philadelphia Civic Center.



Sports Hotline

Need up-to-the minute baseball scores? Want to track your favorite player's statistics? If so, check out the new sports online service from *USA Today* in conjunction with Linc Networks of Greensboro, North Carolina.

The *USA Today* Sports Center (Four Seasons Executive Center, Building 9, Terrace Way, Greensboro, North Carolina 27403) offers a wide range of services, including complete statistics for professional sports, schedules for professional and college sports, personalized news and statistics on a favorite team or player, the latest-breaking sports news and scores via a live ticker wire, and national fantasy-league games for baseball, football, basketball, and hockey.

Online members can also trade, buy, and sell baseball cards, have online conversations with other members or *USA Today* sports experts, purchase authentic professional sportswear, and play popular board games.

An optional graphics telecommunications program ($24.95) displays the board games and the service selections with color graphics.

Science-Fiction Star

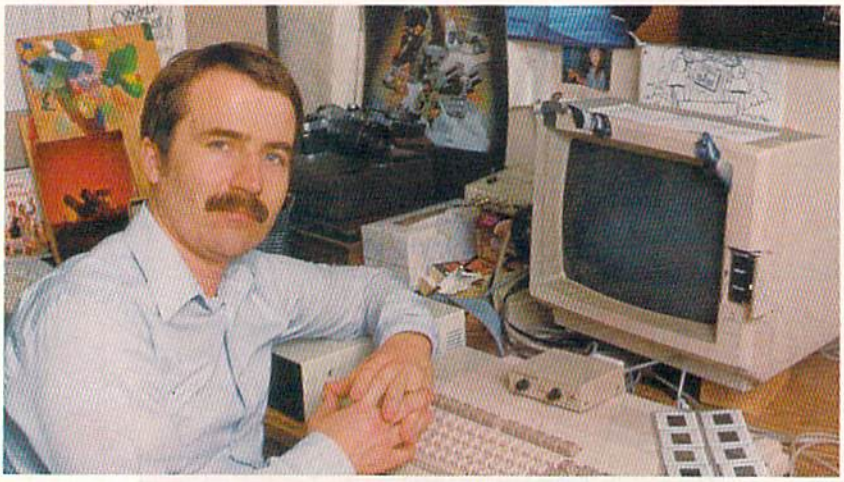
Electronic Arts (1820 Gateway Drive, San Mateo, California 94404) makes you the star in a science-fiction horror-movie setting with *Project Firestart* ($29.95). The game projects the feel of a movie with the use of close-ups, tracking shots, fades, pans, sound effects, and a dramatic musical score.

You must solve the mystery of what is happening to the research ship Prometheus as it orbits Titan, a moon of Saturn. On-board scientists are conducting genetic experiments while trying to create artificial creatures to act as mine workers on distant asteroids. Suddenly, the ship falls silent and the System Science Foundation sends you to investigate. You must find out what has happened, rescue any survivors, find the science log, and then blow up the ship and get out.

During the mission, close-ups of monsters and pans of rooms around the ship move quickly across the screen, making reaction time important. Game activities include battles to the death with monsters and the search for clues, weapons, and security passes in rooms littered with bodies. Tension is built as you hear the sound of the unstoppable self-destruct mechanism counting down. Every phase of the mission must be completed in order for you to solve the puzzle of the Prometheus and defeat its ultimate threat. ▷

COMMODORE CLIPS

NEWS, NOTES, AND NEW PRODUCTS



Computer artist wins TV's Emmy award.

Emmy Award Winner

Ever played *World Class Leaderboard, Echelon,* or *Heavy Metal?* If so, you've had a close-up look at the graphics and animation work of Emmy Award winner Doug Vandegrift. Vandegrift, art director for Access Software, received the most coveted award in television for his work on Jim Henson's "Muppet Babies" on CBS.

Vandegrift was the storyboard director for the animation team that won the award for Outstanding Animated Program for 1987–88.

"I love my work as a cartoonist, but I see a brighter future in home computer entertainment," Vandegrift said. "That's why I devote full time to Access Software. It's different—and very challenging."

Mindscape Inks Agreement

Mindscape has signed a North American publishing agreement with Mirrorsoft, a London-based software publisher. The agreement gives Mindscape the right to publish in the U.S. and Canada multiple titles from Mirrorsoft's Image Works line.

The initial Image Works release by Mindscape will be *Speedball,* a futuristic arena sports game where players use physical and mental talents to bribe officials, tackle opponents, and hurl a metal ball around a steel arena.

Over the past four years, Mindscape has distributed Mirrorsoft's *Harrier Combat Simulator* in the U.S., and Mirrorsoft has distributed in the U.K. some of Mindscape's 16-bit titles, including *Balance of Power* and *Shadowgate.*

Attack Copter

Sega's arcade hit *Thunder Blade* ($34.95) has been released by Mindscape (3444 Dundee Road, Northbrook, Illinois 60062) for the 64.

The game offers two different visual perspectives: top down and from behind the helicopter. The top-down view allows you to see the surrounding area in 3-D, while the view from the rear allows you to fly forward through the approaching landscape.

As helicopter pilot, you must defeat the enemy while flying over skyscrapers, mountains, deserts, and the ocean.

In addition to *Thunder Blade,* Mindscape has released 64 versions of the Sega arcade games *Out Run, Space Harrier,* and *Alien Syndrome.* Future releases include *Shinobi, Action Fighter,* and *After Burner.*

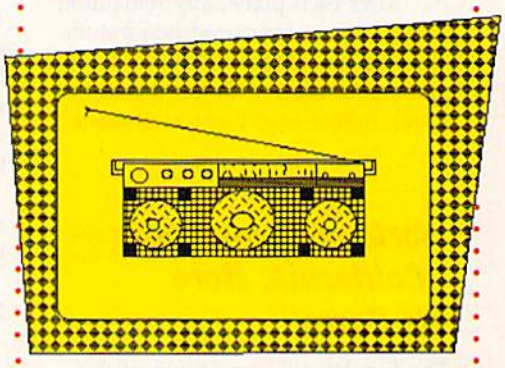
Medalist Names New Line

Medalist International (180 Lakefront Drive, Hunt Valley, Maryland 21030), a division of MicroProse Software, will use MicroPlay as the brand name for its own line of software titles. The games will be developed by MicroProse especially for Medalist.

The first two releases are *Keith Van Eron's Pro Soccer* ($39.95), an arcade-style simulation produced in cooperation with Van Eron, renowned goalkeeper, and *Destroyer Escort* ($34.95), a simulation of naval combat on a World War II battleship.

In *Pro Soccer,* you can play the indoor or the outdoor version of soccer. An overhead point of view provides for 3-D effects.

Destroyer Escort puts you aboard a naval destroyer as you plan the tactics and strategies of an engagement at sea set during World War II.



In Stereo

Your 64 or 128 can now have six-voice stereo music capabilities with the SID Symphony Stereo Cartridge ($34.95), from Dr. Evil Laboratories (P.O. Box 190, St. Paul, Indiana 47272). The cartridge allows you to play Sidplayer songs from both standard and enhanced versions, plus songs available from the public domain. You can also create your own stereo Sidplayer songs with *COMPUTE!'s Music System for the Commodore 128 & 64: The Enhanced Sidplayer,* by Craig Chamberlain, available from COMPUTE! Books.

The cartridge plugs into a 64 or 128, with no assembly required. Two RCA male-to-male cables and a nine-volt alkaline battery are required. G

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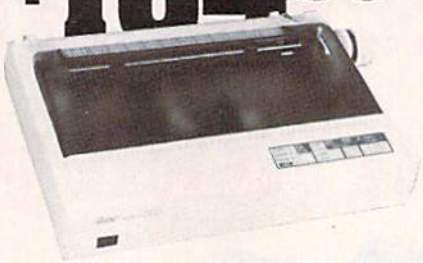

STAR NX1000

NX-1000 Speedy 144cps draft mode, 36cps near-letter-quality. Features include front panel controls and multiple NLQ fonts. Friction and tractor feed, plus convenient single sheet feed mode.

NX-1000 Printer(Parallel)	74827	$164.95
NX-1000C Printer (Commodore)	75060	$169.95
NX-1000 Rainbow Color Printer	75077	$224.95
NX-1000C Rainbow (Commodore)	75783	$224.95

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OKIDATA 180

Features include mode selection, pitch selection, 180 cps in high speed draft mode and 120cps in utility mode. Near-letter-quality text prints at 30cps. Includes both friction feed and fixed tractor for standard width perforated edge. Both Commodore and standard parallel input.

Okidata 180 Printer 71634 $224.95

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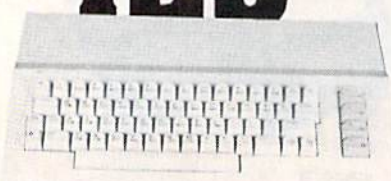

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AMIGA 500

The 500 includes 512K bytes internally and is expandable to 8 MB, two joystick ports, a serial port, a parallel port, an external disk drive port, and a built-in 3.5" disk drive. It even includes a 2-button mouse!

Amiga 500 73729 $CALL

AMIGA 2000

The 2000 has multitasking abilities, sprites, a graphic co-processor and built-in speech. With keyboard, mouse, joystick, RS232 and Centronics ports, the 2000 is a powerful computer. It has a built-in 3.5" disk drive, mounting locations for two external Amiga floppy disk drives and has an internal option for IBM PC/XT compatibility. Standard RAM is a full MB and is expandable to 9 MB.

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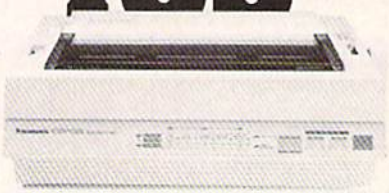

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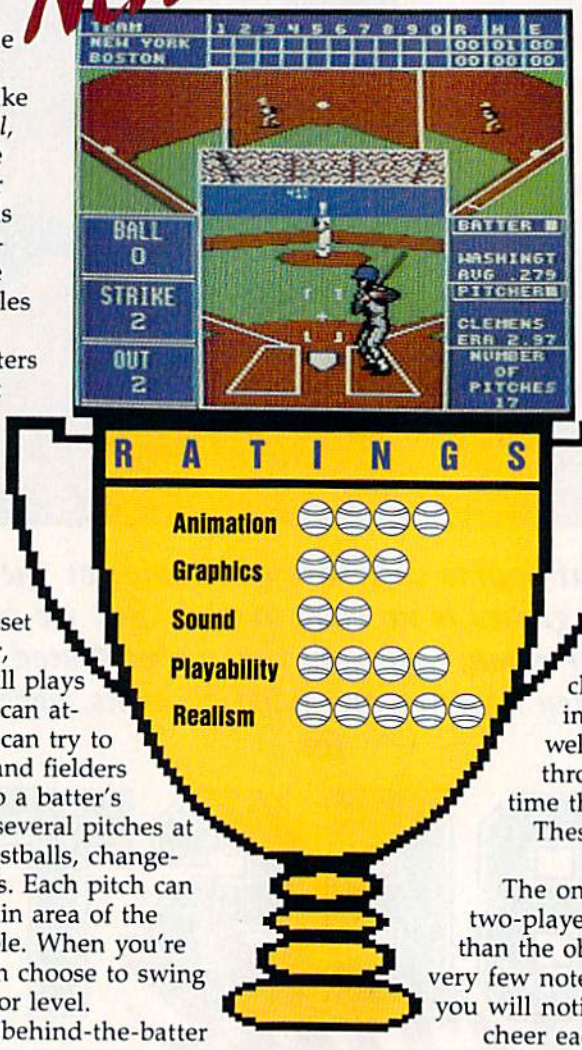
With all the great sports software available for the 64 and 128, picking the best games is no easy matter. But we converted the office into a locker room, and now that we've tested enough games to develop a charley horse in our joystick arms, here are our picks for

BEST *Arcade Sports* GAMES

Edited and compiled by Mickey McLean and Tom Netsel

The Sporting News Baseball

Epyx



Realistic major league baseball teams and action are what make *The Sporting News Baseball*, from Epyx, our top choice among baseball games for the 64. The game succeeds in achieving a balance between strategy and arcade action. You assume the roles of general manager, field manager, and player. Rosters can be made from current major league teams or you can build a team from Hall of Famers. You can also choose whether or not to use a designated hitter in your lineup.

As the field manager, set up your own batting order, make substitutions, and call plays on the field. Base runners can attempt to steal, the pitcher can try to pick off runners on base, and fielders can be moved according to a batter's tendencies. Pitchers have several pitches at their disposal, including fastballs, change-ups, curves, and screwballs. Each pitch can also be targeted for a certain area of the plate, and balks are possible. When you're in the batter's box, you can choose to swing high, low, inside, outside, or level.

The game provides a behind-the-batter view that switches to an overhead angle once the ball is hit. This can be distracting, though, causing the defensive player to momentarily lose the ball.

The graphics are excellent in the pitcher's and batter's boxes, but they're not as sharp in the overhead view, in which the players appear rather small. The animation, however, is excellent in both views. The batter always takes a practice swing before he's ready to hit the ball, and the pitcher nods approval to the catcher's sign before delivering the pitch. The pitching motion is also clearly depicted. Although small in stature, the fielders also move well. You can see their arms move through the throwing motion each time they fire the ball to a teammate. These small touches give a realistic feel to the game.

The only thing lacking in this one- or two-player game is quality sound. Other than the obligatory crowd noises, there are very few noteworthy sounds. The one noise you will notice is what sounds like a Bronx cheer each time a player makes an out.

Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

TOP CONTENDER

HardBall! - *Accolade*

4th & Inches

Accolade

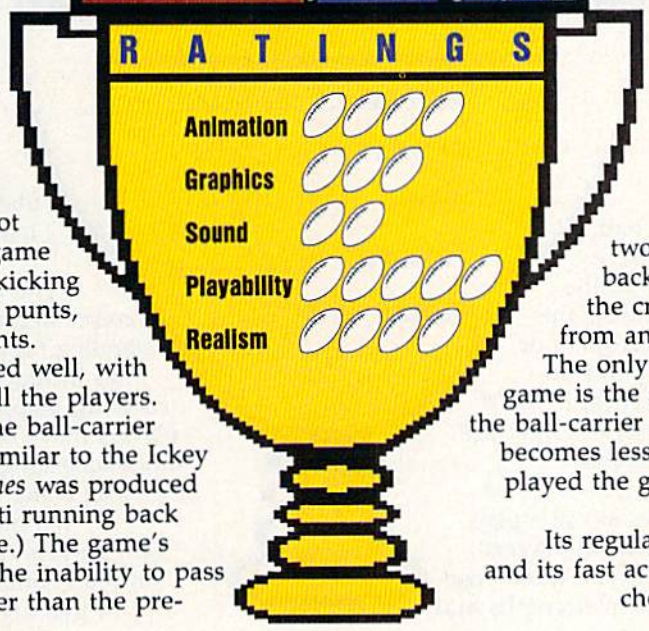
In Accolade's *4th & Inches*, take your opponents deep for the touchdown and then come back and flatten them on defense. Call a variety of offensive and defensive plays and execute them with one control player and ten computer-activated gridiron warriors who are programmed to carry out their assignments on each play. On offense, choose a formation, a play, and a receiver or ball-carrier. When on the defensive side of the ball, choose a formation, a control player, and whether or not to blitz or red-dog. The game also features a complete kicking game, including kickoffs, punts, field goals, and extra points.

The game is presented well, with realistic movements by all the players. After each touchdown, the ball-carrier even performs a dance similar to the Ickey Shuffle. (Note: *4th & Inches* was produced long before the Cincinnati running back popularized his TD dance.) The game's only major limitation is the inability to pass the ball to a receiver other than the preselected one. On the plus side, the defensive control player does change to the defender closest to the ball-carrier as the offensive player moves down the field.

Both teams have rosters with two players available for each offensive and defensive position. Each player on the roster has varying experience and ability. You must decide what type of game you want to play and then select the players who will best carry out your game plan.

Accolade did not include many football sounds with this one- or two-player game. Most of the background noise is limited to the crowd's cheering and music from an offscreen marching band. The only possible distraction in the game is the switching of screens when the ball-carrier moves downfield, but this becomes less of a problem after you've played the game several times and become accustomed to it.

Its regulation 11-on-11 competition and its fast action make *4th & Inches* our choice for top gridiron game.



Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

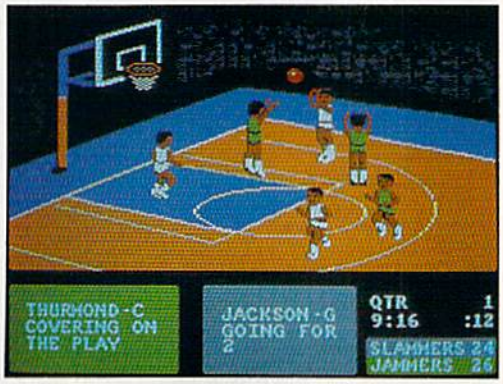
TOP CONTENDER

John Elway's Quarterback - *Melbourne House/Virgin Mastertronic*

BASKETBALL

Fast Break

Accolade



Accolade's *Fast Break* features an up-tempo three-on-three contest on the computer hardwoods between the Jammers and the Slammers, two fictitious pro basketball teams featuring a cast of stars with different talents and abilities. The large, realistic-looking players have moves that would make Mars Blackmon or any other playground legend jealous. Their on-court repertoire includes slam dunks, fadeaway jumpers, and spin moves down the lane. The size of the players also makes it easier to see who has possession of the ball.

Design your own offensive play and incorporate it within the game. When your team controls the ball, you can run your special play or choose from a selection of plays designed by the Accolade coaches. If you'd rather play a run-and-gun style, forget the plays and run a freelance offense.

Defensive plays can also be selected each time the offense decides to call a play. Each team's roster consists of six players, with two available at each of the three positions. Each player has his own strengths and weaknesses. One of your players may be a strong rebounder while his substitute may be a better shooter. You'll need to decide which player can best help your team.

Hack an opponent or become overly aggressive underneath the basket and one of your players could be called for a foul, which could result in one or two shots at the foul line for your opponent. *Fast Break* differs from the real game of roundball only in the number of players on the court (three instead of the regulation five) and the player's inability to throw the ball or step out of bounds.

The variety of sound effects incorporated within the game is an outstanding feature of *Fast Break*. Accolade has included the sounds of the crowd cheering, clapping, and stomping. As the players move on the court, you hear their shoes squeaking and, of course, the sound of the ball being dribbled. The swish of the net has not been left out, either.

Two players can battle head-to-head or one can compete against the computer in this highly rated game of hoops.

RATINGS

Animation	4
Graphics	4
Sound	5
Playability	4
Realism	3

Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

TOP CONTENDERS

Jordan vs. Bird: One on One - *Electronic Arts*

Slam Dunk - *Virgin Mastertronic*

HOCKEY

Superstar Ice Hockey

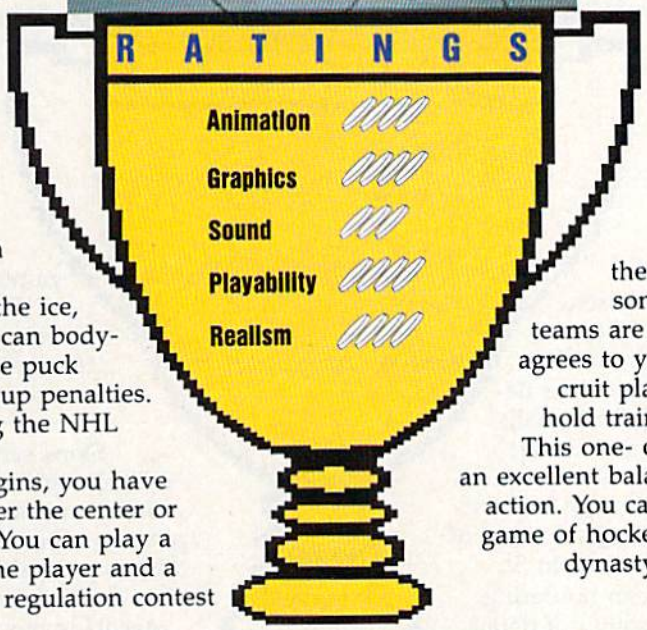
Mindscape

If you've ever wanted to coach a team to the Stanley Cup, Mindscape's *Superstar Ice Hockey* can make you feel as though your dream has come true. Its realistic simulation of a pro hockey team is what makes it our number 1 choice for best hockey game.

You can guide the team through a complete season and personally coach it through each game. You can change defensive and offensive alignment and make substitutions throughout the game, or you can sit back and watch the computer coach your team.

As for the action on the ice, the players on your team can body-check, fake shots, send the puck through the air, and pick up penalties. The action has everything the NHL has—except the fights.

Before each game begins, you have the option to control either the center or the goalie on your team. You can play a two-on-two game with one player and a goalie per team or play a regulation contest with a full complement of six players on a side. Other options include a choice of uniform colors, a choice of rules, and a choice of playing either a practice or a league game.



Player movement is excellent, especially the skating and stick action. After a vicious check from an opponent, a player may end up sprawled on the ice in a daze. Hit your opponent too hard and you'll wind up in the penalty box. While in the box, you have no control player on the ice.

The game keeps track of the standings during the season. Player trades with other teams are possible if the other team agrees to your offer. You can also recruit players from the minors and hold training camps for your team. This one- or two-player game strikes an excellent balance between strategy and action. You can hit the ice for a friendly game of hockey or try to build a hockey dynasty that dominates the other teams in the league.

Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

TOP CONTENDER

Powerplay Hockey: USA vs USSR -
Electronic Arts

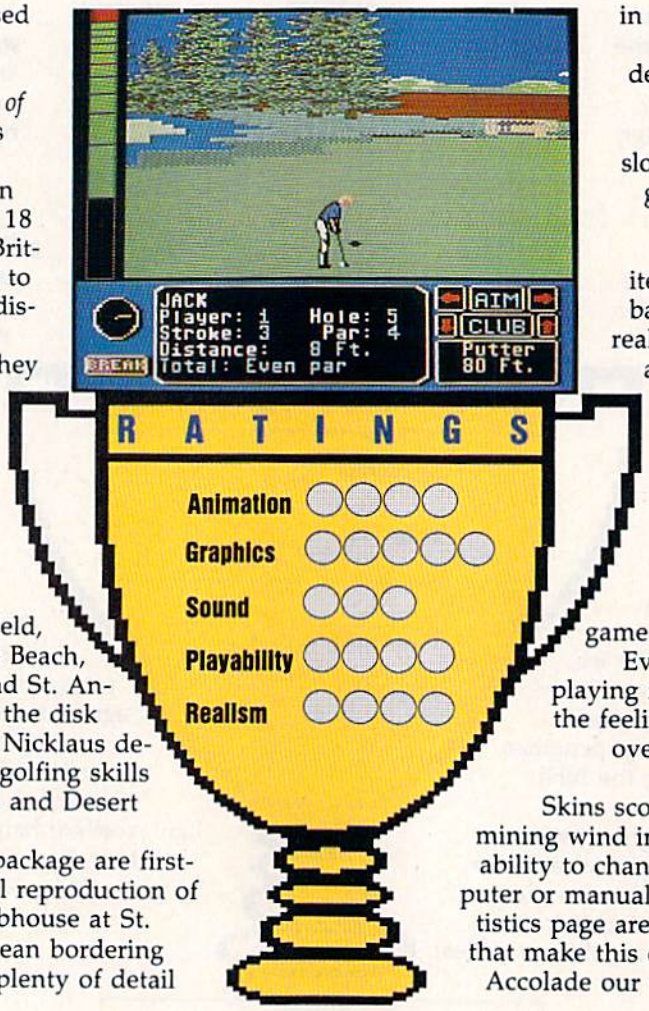
Jack Nicklaus' Greatest 18 Holes of Major Championship Golf

Accolade

Some games are based on movies; others, on books; but *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf* is based on a video. ABC Sports asked golf's Golden Bear to select his favorite 18 holes from the U.S. and British courses that play host to major tournaments. Jack discusses those holes on the video and explains why they rank among his favorites. Then he shows viewers how he plays them.

Now you have the opportunity to play those same holes on your 64 or 128. Visit Augusta, Baltusrol, Muirfield, Merion, Oakmont, Pebble Beach, Riviera, Royal Lytham, and St. Andrews. For added variety, the disk also includes two courses Nicklaus designed himself. Test your golfing skills at Castle Pines, Colorado, and Desert Mountain, Arizona.

The graphics in this package are first-rate. Each hole is a careful reproduction of the original. From the clubhouse at St. Andrews to the Pacific Ocean bordering Pebble Beach, you'll find plenty of detail in this topnotch golfing simulation. This attention to detail doesn't come without a price, however. *Greatest 18*'s screens build more slowly than the ones in some golf games, but the wait is worth it.



Animation, though limited to the golfer and to the ball in flight, is smooth and realistic. Players can compete against up to three human opponents or a variety of computer-generated male and female golfers, including Nicklaus himself.

A large part of *Greatest 18*'s appeal stems from the way the game *feels* through the joystick. Even at the expert level and playing from the pro tees, you get the feeling you have more control over the ball than with other golf games.

Skins scoring or match play, determining wind intensity and direction, the ability to change your perspective, computer or manual club selection, and a statistics page are just a few of the features that make this outstanding package from Accolade our choice for best golf game.

Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

TOP CONTENDERS

World Tour Golf - *Electronic Arts*
World Class Leader Board - *Access*
Leader Board - *Access*

BOXING

TKO

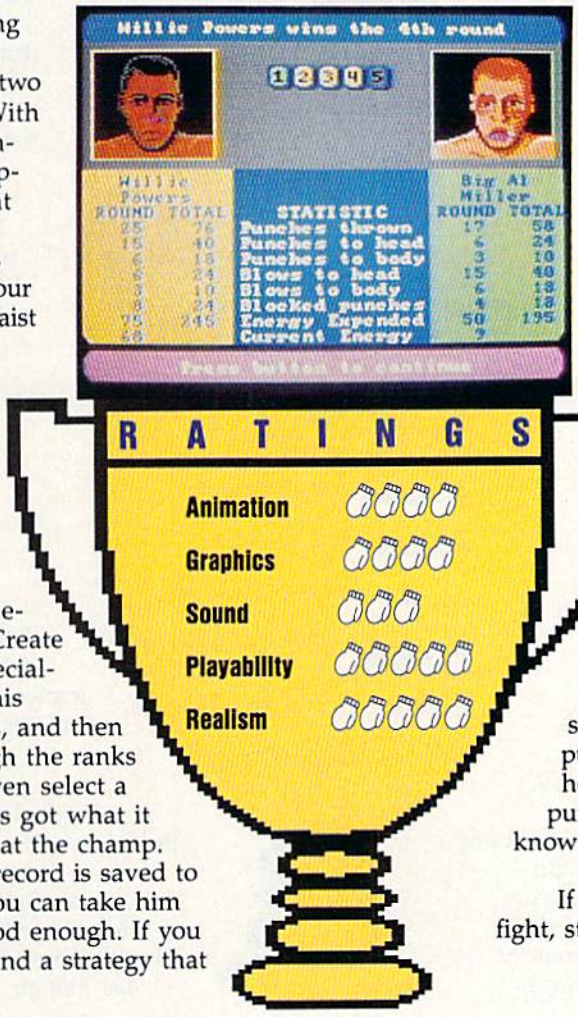
Accolade

Most computer boxing games put you at ringside, watching two brawlers trade punches. With *TKO*, Accolade puts you inside the ring, with your opponent staring you straight in the eye.

A split-screen features large images of you and your opponent seen from the waist up. Your boxer throws a punch to the jaw and you see your opponent's head snap back as your glove connects. Fail to block your opponent's jab, however, and your face gets cut or turns black and blue.

TKO features both one- and two-player options. Create your own fighter with specialized attributes, calibrate his strengths and weaknesses, and then work your way up through the ranks of contenders. You can even select a face for your boxer. If he's got what it takes, you can get a shot at the champ.

A fighter's win/loss record is saved to disk after each bout, so you can take him right to the top if he's good enough. If you start losing bouts, try to find a strategy that will work against your opponent and then create your next fighter accordingly.



Each fighter is drawn with lifelike features and faces that show punishment as the three-, five-, or ten-round bouts progress. Throw a punch with your joystick and your boxer responds immediately. Action is as smooth as a right cross. You can throw nine different punches to the head and body with your joystick. Back your opponent into the ropes and your punches carry more weight. To protect yourself, select a guard position at any time in response to your opponent's attack.

Between rounds, a statistics screen informs you of how many punches each fighter threw to the head and body and of how many punches connected. It also lets you know how much damage each fighter has inflicted.

If you're looking for a good, clean fight, step into the ring with *TKO*. It's a winner by unanimous decision.

Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

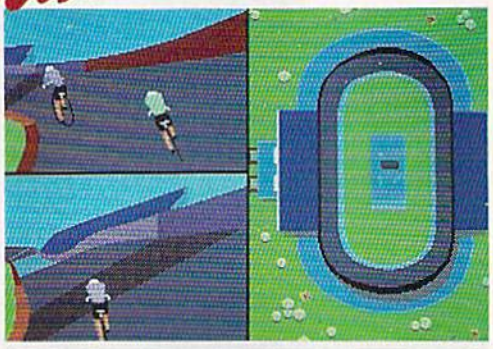
TOP CONTENDERS

Fight Night - *Accolade*
Star Rank Boxing - *Gamestar (Mediagenic)*

OLYMPIC-STYLE GAMES

The Games: Summer Edition

Epyx



When it comes to sports games, no one outscores Epyx in the field of Olympic-style competition. But Epyx surpassed itself when it decided to give players a taste of the Summer Olympics held last year in South Korea. In fact, the team from Epyx does more than simply enter the competition with *The Games: Summer Edition*—it captures the gold medal.

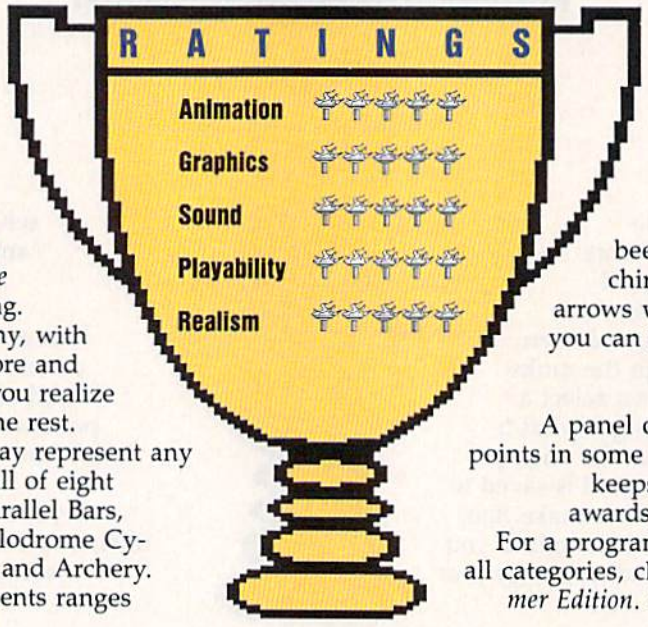
Programmers, musicians, and artists at Epyx went all out to capture the thrill and excitement of Olympic competition. If you were unable to attend the Olympics in Seoul, *The Games* is the next best thing. From the opening ceremony, with its outstanding musical score and snapshots of Korean life, you realize this game is a cut above the rest.

Up to eight players may represent any of 18 countries in any or all of eight events: Diving, Uneven Parallel Bars, Rings, Hammer Throw, Velodrome Cycling, Hurdles, Pole Vault, and Archery.

Participation in the events ranges from simple to complex, giving players several depths of play. To sprint around the velodrome, simply move the joystick forward and backward rapidly. Mastering the 23 different moves on the uneven parallel bars or the 40 possible combinations in the diving event, however, requires concentration and a higher degree of joystick dexterity.

Animation is smooth and flawless, and the participants are well drawn. Sound, often treated as an afterthought in many games, hasn't been neglected, either. Birds chirp at the archery range as arrows whoosh to the target, and you can hear water dripping from the diving board at the Olympic pool.

A panel of animated judges award points in some events, but the computer keeps track of the scoring and awards medals after each event. For a program that takes top marks in all categories, check out *The Games: Summer Edition*. It's a gold-medal winner.



Ratings: 5—excellent, 4—good, 3—average, 2—below average, 1—very poor

TOP CONTENDERS

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Winter Challenge - *Thunder Mountain (Mindscape)*

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A Guide to Commodore User Groups

Part 2

Compiled and Edited by Mickey McLean

This annual *Gazette* feature provides an up-to-date list of user groups across the U.S., throughout Canada, and around the world. Part 1, published in last month's issue, included states *A* through *M* (Alabama–Montana). Part 2 includes user groups from the remaining states (Nebraska–Wyoming), from APO sources, and from foreign countries. Under each state heading, groups are listed in order according to zip code. Groups from outside the U.S. are listed alphabetically under each country heading.

If your group does not appear in this list and you wish to be included next time, send your club name, address, and bulletin board service telephone number (if available) to:

Commodore 64/128 User Group Update
COMPUTE!'s Gazette
P.O. Box 5406
Greensboro, NC 27403

Your group will then be listed in our monthly "User Group Update" column in an upcoming issue of *Gazette*.

Note: When writing to a user group for information, please remember to include with your request a self-addressed envelope with postage that is appropriate for the country to which you're writing.

NEBRASKA

Pathfinder Commodore User Group, P.O. Box 683, Fremont, NE 68025

Greater Omaha Commodore Users Group, P.O. Box 241155, Omaha, NE 68124 (BBS# 402-455-6400)

Mid-Nebraska Users of Commodore (MUC), 1920 N. Huston Ave., Grand Island, NE 68803

McCook Commodore Users Group, 1010 East 2nd St., McCook, NE 69001 (BBS# 308-345-1152)

Platte Valley Computer Users Group (PVCUG), P.O. Box 662, Gering, NE 69341

NEVADA

Clark County Commodore Computer Club (5 C's), 3273 Savalli, Las Vegas, NV 89102

NEW HAMPSHIRE

Manchester Commodore Users Group, P.O. Box 1641, Manchester, NH 03105

New England Computer Pioneers, P.O. Box 815, Contoocook, NH 03229

Commodore Help And Information Network (CHAIN Gang), P.O. Box 1155, Laconia, NH 03247

Commodore Users Group, P.O. Box 129, Concord, NH 03302-0129

NEW JERSEY

Data Exchange-Beneficial Users Group 64/128 (DE-BUG 64/128), 213 Burns Way, Fanwood, NJ 07023

Hillsdale Commodore 64 Users Club, 32 Esplanade Lake Dr., Hillsdale, NJ 07642

Commodore 64 Beginners Group, 680 Leigh Terr., Westwood, NJ 07675

Garden State Commodore User's Group Inc., 89 Stratford Rd., Tinton Falls, NJ 07724

Commodore User Group of Central New Jersey, 112 Old Bridge Rd., Matawan, NJ 07747

Universal Software Incorporated, 83 Bald Eagle, Hackettstown, NJ 07840

Morris Area Commodore User Group (MACUG), P.O. Box 492, Mt. Tabor, NJ 07878

Commodore E. Brunswick Users Group (CEBUG), 9 Kings Rd., E. Brunswick, NJ 08816

NEW MEXICO

Computer Programmers Unlimited (CPU), 2310 Teodoro NW, Albuquerque, NM 87107 (BBS# 417-357-8361)

Los Alamos Commodore Users Group, 4214-A Arizona St., Los Alamos, NM 87544 (BBS# 505-662-5940)

Taos Area Commodore User's Group, P.O. Box 5686, Taos, NM 87571

The Southern New Mexico Commodore User's Group, P.O. Box 4437, Uni. Park Brch., Las Cruces, NM 88003

Deming Commodore User Group (DCUG), 1400 Mallery Dr., Deming, NM 88030

Commodore Users Group of Roswell (CUGOR), 1619 N. Kansas, Roswell, NM 88201

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New York Commodore Interest Group (NYC=ig), 115 Essex St., Box #146, New York, NY 10002

Kids Computer News, St. Hilda's & St. Hugh's School, 619 W. 114th St., New York, NY 10025

Bronx Users Group (BUG-64), P.O. Box 523, Bronx, NY 10475 (BBS# 212-671-7050)

Folklife Terminal Club, Box 555-R, Co-op City Station, Bronx, NY 10475

For Your Computer Only, 35 Belleview Ave., Ossining, NY 10562 (BBS# 914-941-5405)

Commodore User Group of Westchester, P.O. Box 1280, White Plains, NY 10602

Queens Commodore Users Group, 37 Skillman Ave., Brooklyn, NY 11211

The Computer Freaks, 84 Sterling Pl., Brooklyn, NY 11217 (BBS# 718-857-9285)

Brooklyn Commodore User's Group, 1735 E. 13th St., Apt. 7N, Brooklyn, NY 11229-1952 (BBS# 718-945-1969)

Universal Processing Institute, 45-45 220th St., Bayside, NY 11361

Commodore Users Group of Greater New York, 190-25 Woodhull Ave., Hollis, NY 11423

Commodore Long Island Club, Inc., 2949 Roxbury Rd., Oceanside, NY 11572

BLCC, 151 DuBois Ave., Sea Cliff, NY 11579

Brentwood 64/128 Computer Club, Pub. Lib., 2nd Ave. & 4th St., Brentwood, NY 11717

Quicksilver Users International Commodore Knights (QUICK), 33 Smith Ln., Centereach, NY 11720

MI-Comm User Group, 26 Azalea Rd., Levittown, NY 11756

Club 64, P.O. Box 2265, Patchogue, NY 11772

Ridge C-64 Users Group, 94 Ridge Rd., Ridge, NY 11961

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Catskill Commodore Users Group, Box 160 R.F.D., Woodbourne, NY 12788

Frontier Computer Users, R.F.D. 1, Box 352A, Chazy, NY 12921 (BBS# 518-846-8803 or 518-846-8934)

Oswego Commodore User Group, 424 Mahar Hall, State University College, Oswego, NY 13126

Central New York Commodore Users Group (CNYCUG), 6887 Peck Rd., Syracuse, NY 13209

The Commodore Computer Club of Syracuse, P.O. Box 2232, Syracuse, NY 13220 (BBS# 315-656-3544)

Mohawk Valley Computer User Group, c/o Hofmann, 78 Garfield St., Ft. Plain, NY 13339

Utica Commodore User Group, 1801 Storrs Ave., Utica, NY 13501

Commodore Users Group of Massena (COMA), 7 Water St., Massena, NY 13662 (BBS# 315-764-1560)

Leatherstocking Computer User's Club, P.O. Box 1284, Oneonta, NY 13820 (BBS# 607-433-2313)

The Rainbow International C-64 Users' Group, 55 Expressway Village, Niagara Falls, NY 14304

The Niagara Falls Commodore/IBM Club, 2405 Willow Ave., Niagara Falls, NY 14305

Geneva Commodore Users' Group, 25 Pine St., Geneva, NY 14456

Commodore Users Group of Rochester (CUGOR), P.O. Box 23463, Rochester, NY 14692

Com-puter Club, P.O. Box 4339, Elmira, NY 14904

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Foothills User Group, 1012 Jesse Tr., Mount Airy, NC 27030

Triad Commodore Users Group, P.O. Box 10833, Greensboro, NC 27404 (BBS# 919-288-0372)

Sanlee Commodore Club, 514 Colonial Dr., Sanford, NC 27505

Baileys User Group (BUG), P.O. Box 70, Holly Springs, NC 27540

Computer Users of Lincolnton, Rt. 3, Box 351, Lincolnton, NC 28092
Salisbury Compute, Rt. 1, Box 349B, Salisbury, NC 28144
Wilmington Commodore Users Group, 2104 Wisteria Dr., Wilmington, NC 28401
Down East Commodore Users Group, P.O. Box 1255, Havelock, NC 28532
Unifour Commodore Users Group, P.O. Box 9324, Hickory, NC 28603-9324 (BBS# 704-328-4875)
Asheville-Buncombe User Group (A-BUG), P.O. Box 15578, Asheville, NC 28813

NORTH DAKOTA

Central Dakota Commodore Club, P.O. Box 1584, Bismarck, ND 58502-1584

OHIO

The Commodore User Group, Inc. (TCUG), P.O. Box 63, Brice, OH 43109 (BBS# 614-755-2604)
Central Ohio Commodore Users Group, P.O. Box 28229, Columbus, OH 43228-0229 (BBS# 614-274-6502)
South Toledo Commodore Computer Club, P.O. Box 6086, Toledo, OH 43614
Basic Bits Commodore Group, P.O. Box 447, N. Ridgeville, OH 44039
Commodore Preference Users Connection (CPU Connection), P.O. Box 42032, Brook Park, OH 44142 (BBS# 216-238-4578)
Cuyahoga Falls Commodore Club, P.O. Box 3025, Cuyahoga Falls, OH 44223
Mahoning Valley Commodore Club, P.O. Box 1180, Youngstown, OH 44501
Commodore Users Group, 29425 Bettler Rd., Box 175, Dennison, OH 44621
Canton/Akron/Massillon Users Group (CAMUG), P.O. Box 2423, North Canton, OH 44720
Mid-Ohio Commodore User's Club, Box 1363, Cassell Rd., Butler, OH 44822
Commodore Erie Bay Users Group (CEBUG), P.O. Box 1461, Sandusky, OH 44870
Cincinnati Commodore Computer Club, c/o Cure of Ars School, Berwick & Roe Streets, Cincinnati, OH 45227
Southwestern Ohio Commodore Users Group (SWOCUG), P.O. Box 46644, Cincinnati, OH 45246
The Dayton Area Commodore Users Group (DACUG), 1117 Lavern Ave., Kettering, OH 45429
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Commodore User's Group of Lawton, P.O. Box 3392, Lawton, OK 73502 (BBS# 405-357-6181)
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Osage/Kay Commodore User's Group (OKCOM), 317 Woodbury, Ponca City, OK 74601

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Butler Commodore 64 User Group, P.O. Box 2408, Butler, PA 16001
Castle Commodore Computer Club, P.O. Box 961, New Castle, PA 16103 (BBS# 412-946-8592)
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Harrisburg Area Computer Group, 721 S. 29th St., Harrisburg, PA 17111
White Rose Commodore Users Group, P.O. Box 7501, York, PA 17404-0501
CenPUG for Commodore, R.D. 4, Box 99A, Jersey Shore, PA 17740
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Lehigh Valley Commodore User Group, 4315 Crackersport Rd., Allentown, PA 18104
The Scranton Commodore Users Group (SCUG), 499 Mulberry St., #804, Scranton, PA 18503 (BBS# 717-489-5819)
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EPA Commodore Users Group, Edward H. Cohen, 1712 Aidenn Lair Rd., Dresher, PA 19025 *(Note: Open to all federal government employees and their families.)*
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Buxmont Commodore Users Group, 1206 Cowpath Rd., Hatfield, PA 19440
Commodore Users of Berks (CUB), 810 Sledge Ave., West Lawn, PA 19609

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Commodore Association of the Southeast (CASE), P.O. Box 2745, Clarksville, TN 37042-2745
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128 Users of Dallas/Ft. Worth, P.O. Box 28277, Dallas, TX 75228-0277 (BBS# 214-285-7646)
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Commodore Houston User Group (CHUG), P.O. Box 612, Tomball, TX 77375 (BBS# 713-445-2484)
The Willis Commodore Users Group, 8 Forest Trails, Willis, TX 77378
Tri-County Commodore Users Association (T-CCUA), 557 Lakeview Cir., New Braunfels, TX 78130 (BBS# 512-620-1371)
Amistad Commodore Users Group, P.O. Box 421212, Del Rio, TX 78842
Top of Texas Commodore (TOTCOM), Box 2851, Pampa, TX 79066-2851 (BBS# 806-665-4764)
Tri-State Commodore Users Group (Tri-CUG), P.O. Box 8971, Amarillo, TX 79114-8971
Commodore Users of Texas (CUT), 7007 Memphis Ave., Lubbock, TX 79413
El Paso Commodore User Group, P.O. Box 370934, El Paso, TX 79904 (BBS# 915-833-1024)

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Mountain Computer Society, 3898 Cheryl St., West Valley, UT 84119
Cache Valley Computer Club, 315 W 400 S, Smithfield, UT 84335 (BBS# 801-752-1187)
Moab Commodore User's Group, 860 S. Antiquity Ln., Moab, UT 84532
Payson Area Commodore Users Group (PAC), P.O. Box 525, Salem, UT 84653 (BBS# 801-423-2734)
Southern Utah Commodore Hobbyists, 528 N. Blue Sky Dr., Cedar City, UT 84720

VERMONT

Connecticut River Users Group (CRUG), P.O. Box 151, Westminster, VT 05158

VIRGINIA

Northern Virginia Commodores, 9206 Annhurst St., Fairfax, VA 22031
WAC User Group, 3309 Rose Ln., Falls Church, VA 22042
Capitol Area Commodore Enthusiasts (CACE), 607 Abbotts Ln., Falls Church, VA 22046
Washington Area Commodore User Group, P.O. Box 684, Springfield, VA 22150-0684
Dale City Commodore Users Group, Inc., P.O. Box 2265, Dale City, VA 22193-0265
Fredericksburg Commodore Club, P.O. Box 8438, Fredericksburg, VA 22404-8438
South Richmond Commodore User Group, P.O. Box 1393, Midlothian, VA 23113
CURVE, P.O. Box 28284, Richmond, VA 23228 (BBS# 804-288-1439)
The Richmond Area Commodore Enthusiasts (TRACE), 2920 Pinehurst Rd., Richmond, VA 23228
Tidewater Commodore Users Group, P.O. Box 61814, Virginia Beach, VA 23462 (BBS# 804-499-1319)
Peninsula Commodore Users Group, P.O. Box L, Hampton, VA 23666 (BBS# 804-886-0901)
Portsmouth Commodore Users Group (PCUG), P.O. Box 6561, Portsmouth, VA 23703 (BBS# 804-488-8372)
Southside Virginia Commodore Users Group, 240 14th Ave., Hopewell, VA 23860
Henry County Commodore Computer Club, Rt. 9, Box 61, Martinsville, VA 24112
Lynchburg User Group, Rt. 2, Box 180, Lynchburg, VA 24501
Commodore Users of Lynchburg (CUOL), P.O. Box 3386, Rivermont Station, Lynchburg, VA 24503 (BBS# 804-845-3135)

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in our monthly
"User Group Update."

REVIEWS

First over Germany

The package shows a B-17 being attacked by German fighter planes, but don't be misled—*First over Germany* is not a true flight simulator.

There are several reasons for this. Foremost perhaps is that Strategic Simulations has more experience in creating board-type war games and D & D–type adventures. *First over Germany* has elements of both genres. Second, the graphics for the game were created with *Graphics Magician*, the animation system used in the graphics adventures from Polarware. While it's a good system, it does not lend itself to flight simulator–style animation.

But all this is not to say that *First over Germany* is unworthy of your consideration. Taken as a whole, it emerges as a *mission* simulator—one with a lot of challenges.

Before you start playing, make a copy of the disk. Any copy program should work. This is necessary because *First over Germany* writes information to the disk each time you play.

Next, select a crew. Try to choose the men who possess the best combination of aptitude, experience, and stamina. It is all well and good to have a bombardier with high stamina, but if he has so little aptitude or experience that he can't hit the target, he'll be of no real use. On the other hand, remember that he hangs in space surrounded only by the plexiglass nose of the plane. If you, the pilot, are prone to crashing, the bombardier could probably benefit from a little extra stamina.

OK, you have a crew and now it's time to learn to fly. The screen shows an overhead view of Wendover Field, with flight instructions and a superimposed flight path. At the bottom of the screen are readouts for altitude, speed, power to the four engines, flap attitude, and so on. Nothing in the scene suggests you are in the cockpit of the aircraft. In fact, the plane is seen poised on the runway down there; remember, this is not a flight simulator.

The manual gives step-by-step instructions for takeoffs, climbs, turns, and descents. Basically, you're to take off, fly a circle, and land, but it's not as easy as you may think: Clouds scud across the sky, you must take into account wind drift, and your aircraft makes much broader turns than any other fighter plane you may have flown.

Represented as a black dot moving over the map, your B-17 moves ever so slowly. As you fly, you'll notice a formation of black dots moving from west to east. You don't have to pay attention to them now, but in the next practice mission you'll have to join the formation.

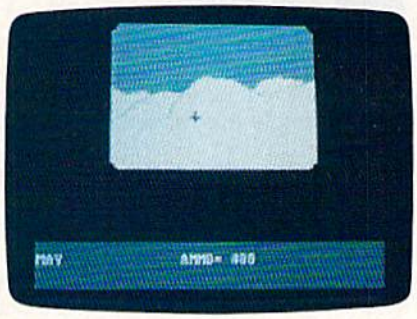
Subsequent missions must be flown in order. They include bombing practice and flights to Chanute Field, Illinois; Westover Field, Massachusetts; Gander, Newfoundland; Preswick, England; and Thurleigh, England. If you've chosen a navigator with high aptitude and experience, you'll probably make it.

Do your utmost to maintain heading and altitude. The alternative is to fall out of formation and become easy pickings for some hotshot Luftwaffe fighter jockey.

Upon arrival in England, you'll finally get to fly combat missions over France and Germany. There are 25 missions in all, bombing industrial targets, ports, shipping yards, U-boat pens, and the like. All missions are said to be authentic versions of those flown by the 306th Bomber Group, on whose exploits the game is based.

Along the way, you'll encounter enemy fighters and flak. In spite of these, you should do your utmost to maintain heading and altitude. The alternative is to fall out of formation and become easy pickings for some hotshot Luftwaffe fighter jockey.

The hazards are real and cause real damage to your aircraft. You may have to contend with damage to one or more engines, fuel lines, the oxygen system, guns, and even the pilot (you). If you do get injured, it's time to hope you've picked a copilot with the right qualifications. Joystick response diminishes, reflecting his level of expertise.



As you fly, the scale of the map/landscape varies, changing from high altitude to an enlarged view as you descend for a landing. There are views from inside the aircraft, including a pilot's view, but these are not meant to compete with screens in true flight simulators. These views are static, with nonworking instructions, and with enemy aircraft indicated by black dots in the sky.

Again, the idea is not to simply send you into the sky in an aircraft simulator, but to provide you with the overall experience of a real bomber group. While the graphics and the rudimentary animation may be disappointing to some, I doubt that those who trouble to involve themselves in the missions will be displeased with the game.

The documentation for *First over Germany* is good and includes a brief history of the 306th, as well as step-by-step instructions for learning to fly. Although there may seem to be many training and transit flights, remember that their purpose is to provide you with experience before sending you into combat. Toward this end, each flight ends with a status report on the crew and an efficiency rating for the pilot.

Although the game combines elements of board war games and adventure games, it doesn't involve the same complexity of control. You'll use both keyboard and joystick to fly. The keyboard commands, for the most part, are keyed to the alphabet: *F* to lower flaps, *R* to raise them, *T* to display time, *N* to

call on the navigator.

In the final analysis, *First over Germany* is disappointing if approached as a flight simulator but impressive if approached as a mission simulator. Because of the many missions involved, it should provide hours of entertainment.

—Ervin Bobo

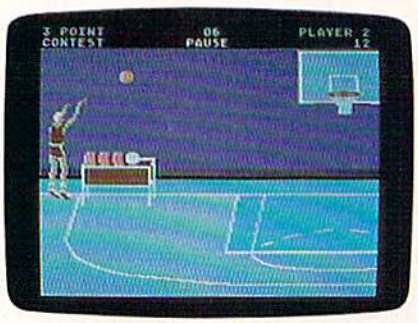
First over Germany
Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043
$49.95

Jordan vs. Bird: One on One

Basketball can happen anywhere. Thanks to the electronic age, the minimum space requirements for the game have shrunk to the few square feet of a computer. Instead of visiting a gym, you simply boot a disk when you want to hear the familiar rhythm of a dribbled ball and the high-pitched squeak of busy basketball shoes.

Hoping to capitalize on this phenomenon, Electronic Arts has consulted two of the world's foremost basketball pros and created in their image the ultimate one-on-one computer game.

Basketball superstars Michael Jordan and Larry Bird collaborated with computer game designers Mark Madland, Steve Chin, Joe Hellesen, and Garth Hitchens to produce a basketball



simulation worthy of their combined efforts. The result is *Jordan vs. Bird: One on One.*

You may remember an earlier *One on One* by EA that featured Larry Bird and Dr. J (Julius Erving). While the game was impressive in its day, the earlier version can't compare to the newer version with its improved flexibility and superior graphics.

If you like basketball, *Jordan vs. Bird* is a computer game you'll relish. Imagine yourself controlling the accuracy and touch of Larry Bird's long game or launching yourself gracefully through the air toward a reverse-slam dunk, just like Michael Jordan. Sounds easy, you say? Think again. If you want to jump with the big boys, you'll have to spend practice time on the floor, learning your moves. Fortunately, *Jordan vs. Bird* allows warmup opportunities in each of its three separate events.

Four difficulty levels, from a simple recreational mode to a no-holds-barred professional war zone, gradually acclimate newcomers to the fine art of advanced elbow swinging.

In the One-on-One section, you assume the identity of either Larry or Michael, and the computer becomes the other. Or, if you wish, you and a friend can square off against each other, each becoming one of the two NBA heroes.

The rules are simple and not much different from the half-court rules most of us learned in our youthful playground days. Using the easy-to-understand menu, you can modify the rules before play begins.

Drive, dart, shoot, and dunk your way to an 11- or 15-point preset objective—scoring 1 point for each shot within the 3-point line and 2 points from beyond the line. If you and your partner have the stamina, you can play a full game with 2-, 5-, 8-, or 15-minute quarters.

It took me only a short while to get the hang of *Jordan vs. Bird,* and it wasn't long before I modestly proclaimed myself the *Sultan of Slam.* I was disappointed, however, that each player's super moves could not be seen on the Slow Motion Instant Replay option mentioned in the documentation booklet. This option is missing from the 64 version and is reserved for IBM PC users who share this same booklet. Still, I found the other options and the game itself most entertaining, especially when you let the computer play itself. That's when Jordan and Bird tear up the court for your amusement.

After each quarter, the computer displays both players' stats, enabling truly competitive players to adjust their games accordingly.

Air Jordan's Slam Dunk Contest is the segment of the program where aerial displays of human flight are quite ordinary. Up to four players soar through the air with the greatest of ease, competing for the favor of the judges and the highest ratings.

You choose from the ten hottest dunks in the NBA, including the Twister, Kiss the Rim, Air Jordan, Two Hand Hammer, Windmill, and Back Slam. The player who executes the best dunks and scores the highest ratings wins. With the Follow the Leader option, Michael Jordan chooses and demonstrates one of his dunks; then you and your group try to duplicate it.

Not to be outdone, Larry offers Larry Bird's 3-Point Contest. Here, you'll find out who's the best shooter at a distance of 23 feet, 9 inches from the basket. Again, up to four players take turns shooting, while the program keeps track of the stats. You have 60 seconds to shoot five balls from each of five bins placed at different locations just beyond the 3-point line. As with the other events, a Warm-Up section with no time limit allows the players to practice before entering the competition.

This well-packaged game for the 64 comes with a double-sided game disk, a Command Summary Card, and a documentation booklet chock-full of

information and tips from the master hoopsters themselves. The opening music that accompanies the title, don in a Rap-and-Roll style, will make you laugh. As a matter of fact, this game scores consistently high from every area of the court. At no time does come close to getting into foul trouble

—Steve Hedric

Jordan vs. Bird: One On One
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
$29.95

Rocket Ranger

The ME-109s dive on you as you br through the clouds. A slight adjustm to the rocket pack strapped to your b quickly lifts you above the wave of Nazi fighter planes. More attackers swarm past with machine guns blazing. You blast several planes with your deadly radium pistol, but it's too late. Your rocket pack is shattered by enemy fire. It falters, and you plunge toward earth.

What's a mild-mannered scientist like you doing in a situation like this? It probably all began when you first loaded *Rocket Ranger,* an interactive movie from Cinemaware that mimics the movie serials popular in the Saturday matinees of yesteryear.

After *Rocket Ranger*'s opening credits, you find yourself working in your lab late one night in Ft. Dix, New Jersey. The year is 1940. Suddenly, a rocket pack, a radium pistol, a wrist monitor, and a secret decoder wheel materialize on your desk.

An accompanying note explains

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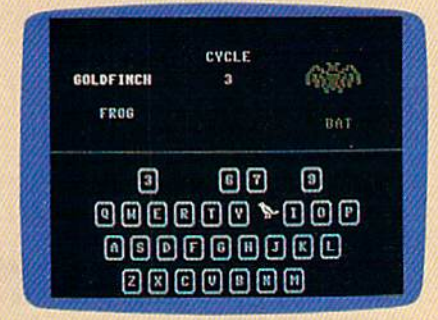

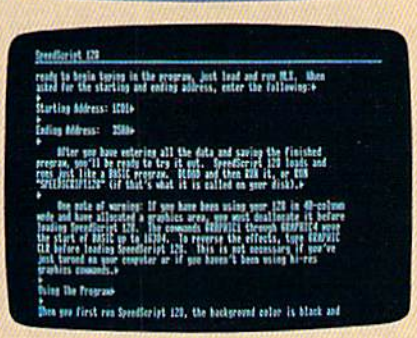

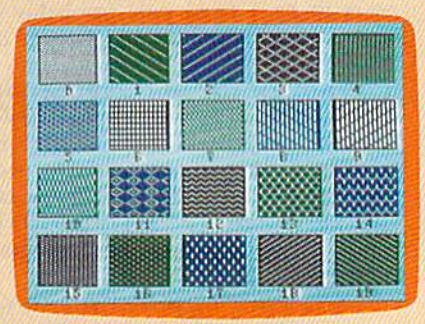

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that a group of scientists in the year 2040 have sent you these objects via a time machine. They hope you can use them to change the course of history and prevent the Nazis from winning World War II.

Apparently, a cosmic error has given Nazi technology a tremendous boost—allowing this gruesome gang of goose-steppers to win the war in 1940 without America's having a chance to intervene. All this revolves around a base on the moon where the Nazis mine lunarium, a powerful element that fuels rockets and rocket packs.

As Rocket Ranger, you must delay the Nazis long enough to locate the five secret rocket parts needed to build your own spaceship. Then, try to capture enough lunarium to power it to the moon, where you hope to stop the Nazi war machine.

Chapter 1 of this two-disk game begins in Ft. Dix, your base of operations. America's top scientist, Professor Otto Barnstorff, and his beautiful daughter, Jane, have been kidnapped by the Nazis. The pair are being transported by Zeppelin to Germany, and from there to a desert rocket base for a trip to the moon. The Nazis plan to use the professor to increase the efficiency of their lunarium operation. In addition to performing your other chores, you must prevent this from happening.

Strap on a rocket pack and bash the bad guys in jet-propelled arcade style.

At Ft. Dix, *Rocket Ranger*'s joystick-controlled menu gives you four choices: War Room, Fuel Depot, Rocket Lab, and Takeoff. Military intelligence has assigned five agents to work for you, to help you locate the rocket factories, lunarium bases, and military targets. You contact them in the War Room, read their reports, and order them to infiltrate and develop resistance efforts in any of 26 different countries.

Since you need fuel for both your rocket suit and the moon rocket, it's imperative that your agents and their resistance fighters locate supplies of lunarium. Your agents are trained for this kind of work, but you must give them their orders. Send them where they can do the most good—but watch out for the Gestapo and the sinister Colonel Leermeister. You can also raid the lunarium bases yourself to augment your supplies; you should send the element back to the Fuel Depot, which keeps track of your quantity.

The Nazi Zeppelin Fleet spreads across Europe, Africa, and South America with increasing speed unless you slow its progress. Rescuing the brilliant professor and his beautiful daughter will buy you more time to assemble your moon rocket. And since this is war, it also helps if you blast a few of Herr Hitler's henchmen with your trusty radium pistol.

But you can't fight the entire war from Ft. Dix. You need the rocket pack to make a rescue attempt, to steal rocket parts, and to destroy targets. Your decoder wheel lets you know how many units of lunarium your rocket pack needs for each destination. It also serves as a form of copy protection. Getting off the ground takes a little practice. Takeoffs can be tricky—and humorous—when you're carrying a heavy load of lunarium; the animation is particularly good during this sequence.

In a typical encounter with the Nazis, Rocket Ranger must box his way past a brawny Nazi guard, avoid aerial torpedoes fired from enemy Zeppelins, take on squadrons of fighter planes, trade shots with gunners hiding in jungle temples, and blast away at hostile antiaircraft batteries. All this happens before he even reaches the moon and faces a legion of Amazon guards.

The graphics and animation are impressive in all these arcade-style scenarios. The artists did a particularly good job when they created Jane Barnstorff. Any red-blooded American hero would want to rescue her before the Nazis were able to turn her into a zombie and force her to mine the moon's lunarium.

Cinemaware didn't skimp on the audio, either. Each sound adds to the drama—from the takeoff to the realistic SOS of your wrist computer. Bob Lindstrom's original musical compositions especially capture the feel of the campy Saturday serials. An unexpected bonus to the audio effects is ReelTalk, Cinemaware's own technique for making animated characters speak with digitized voices.

Cinemaware has put a lot of thought and effort into *Rocket Ranger*, and it shows, right down to the documentation. The instructions needed to play the game are in one booklet, making it easy to find operational answers when you're playing the game.

Another entertaining booklet (this one sent from the future) explains the plot and includes training manuals for the rocket pack and other items. It's fun to read for its tongue-in-cheek Teutonic flavor and its numerous *under penalty of death* warnings. It also includes a brief history of the *Rocket Ranger* movie serials. This adds a nostalgic touch for those old enough to remember the black-and-white adventures, and it provides background for those too young to remember the likes of Commando Cody.

In addition to capturing the atmosphere, plot, and sounds of the Saturday serials, *Rocket Ranger* is fun on both a strategic and an arcade level. You can

put on your jet jacket and zoom around the globe, but you can't defeat the diabolical fiends just by playing superhero. It takes some strategic planning to develop an effective network of agents and resistance fighters. You need their help to locate and infiltrate rocket factories and to capture supplies of lunarium. With your agents in place, you can strap on a rocket pack and bash the bad guys in jet-propelled arcade style.

—Tom Netsel

Rocket Ranger
Cinemaware
4165 Thousand Oaks Blvd.
Westlake Village, CA 91362
$34.95

Predator

Is this game one of Activision's better efforts? *Predator* is an arcade shoot-'em-up combined with some text-adventure puzzles, but somehow the game fails to involve me.

Apparently, the writers of the documentation assume everyone has seen the movie on which *Predator* is based. If you haven't, you'll probably have no idea why you're leaving a helicopter in the midst of what seems to be a jungle war.

For that matter, you won't even know how to leave the chopper. As the game begins, men slide down what appears to be a fixed pole (probably a rope) and then run off the right edge of the screen.

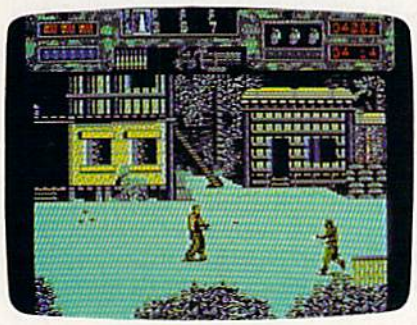
Though the documentation doesn't mention it, each man carries a different weapon. When one appears carrying a weapon you wish to use, click on the fire button. Now you've assumed control of Major Dutch Schaefer—the role Arnold Schwarzenegger played in the movie.

Next, you move to the right, across a screen that scrolls as you near the

edge. Along the way, enemy soldiers appear and shoot at you. It's a good idea to shoot back. Scoring a hit on a soldier (or having a soldier score a hit on you) causes blood and gore to erupt from the victim's back. (It's not as gruesome as you might think—I didn't notice the blood and gore until my wife pointed it out.)

Along the way you'll discover the bodies of your fallen comrades. If you think one of their weapons contains more ammunition than yours does, you can swap. Simply drop your weapon and pick up another one. Check the status bar at the top of the screen to see if you've made a good trade.

The status bar also lets you know about your other weapons, such as hand grenades and bulletproof vests, as well as the proper function keys to activate them. There's also a clock and a scoreboard.



You start with three hand grenades, but you can get other weapons and ammunition by searching the chests that litter the jungle path. Some chests contain booby traps, and the only way to find out whether they do is to open them. Even then, some of the icons that represent the weapons are hard to identify on the monitor. The grenades and extra ammo are fairly clear, but I have no idea what some of the other weapons are or when to use them. Good luck.

From time to time, you'll hear a strange sound and see a glowing triangular object move across the screen. This is the targeting device of an alien creature, the Predator of the title. Don't let it center on you. While you can be shot several times by the soldiers, the alien needs to zap you only once for the game to end.

When you've made it to the village where soldiers shoot at you from windows, you've completed level 1. You'll be awarded bonus points based on the length of time it took you to get there.

Level 2 begins in another section of the jungle. After only one scroll of the screen, I found myself stopped by a brush-covered barrier that I couldn't get through. I tried everything to get by: shooting, throwing hand grenades, jumping, pulling, kicking, and running. Whatever it was, I was stuck there until the clock ran out and the game ended. It seemed a shame, since the package boasts that the game has 30 screens of nonstop terror. Once you've fought your way through a level a few times, you're supposed to learn its pitfalls so that it's easier to complete the level the next time.

After a lot of trial and error, I managed to overcome level 2's brush-covered obstacle. It turned out to be a large rotten log. You have to stand at just the right spot to jump on top of the log; once you've landed, you fight your way along it to the next level.

The game is an existential dilemma in that your only purpose seems to be to stay alive and accumulate points. Since you have no other apparent reason for being there, it would have been better to remain in bed. In fact, following the frustration of level 2, I'm inclined to return to bed, assume a prenatal position, and turn the electric blanket up to 9. (Though after thinking it over, perhaps I'd have better luck if I swapped my M-16 for a flamethrower.)

Now for the technical aspect of the game. I'm a great believer in brief documentation, but *Predator*'s is so brief that you don't know what you're doing in the jungle or whether there's anything at the end of your quest. Maybe it's a good idea to see the movie first.

The packaging and documentation are no help in determining whether you'll see any sign of the Predator other than its triangular image. I still don't know if you eventually face it in direct combat. I have a feeling the Predator is that armor-clad bad guy who keeps zapping me off the second log. I know there's a way past him, but this is another of the game's puzzles I've yet to solve.

Predator's graphics are small, but they range in quality from adequate to good. The same can be said for the sound effects. Unfortunately, I haven't advanced far enough into the game to discover the excitement of what I assume was a rousing good movie. Once again, I assume that excitement is lurking somewhere down the path.

Computer adaptations of movies usually contain only simplified sequences or the bare outlines of the plot—so I won't fault *Predator* for that. But I've always been impatient with those who buy a movie title and then write a game for it, hoping to cash in on the movie's popularity. This has happened too often in the past, and I'm afraid it's also the case with *Predator*.

—Ervin Bobo

Predator
Activision
P.O. Box 3048
Menlo Park, CA 94025
$14.95

Deathlord

Electronic Arts, publisher of the excellent Bard's Tale series, has come out with another solid fantasy adventure. While it may not be a breakthrough, *Deathlord* is a very enjoyable game.

Deathlord is different from the standard fantasy game. Instead of being staged in the usual European-flavored scenario, it is set in Japan and has a complement of samurai, ninja, yakuza, and other Oriental characters. You may at first have a problem identifying so many different characters and recognizing their attributes. But as you play, you'll soon learn all their names and skills.

After you've made two scenario disks, you assemble a party of characters. You can choose from 16 classes, including fighters, thieves, peasants, and four different users of magic. Instead of creating all new characters, you can import your favorites from either the Bard's Tale series or *Ultima III*. Once you've selected a party of up to six characters, you're ready to begin your search for the evil Deathlord.

The* Deathlord *world is huge—there are 16 continents, each with its own cities, towers, dungeons, and ruins.

It won't be easy—the *Deathlord* world is huge. There are 16 continents, each having its own cities, towers, dungeons, and ruins. Each dungeon or tower can have up to 16 levels that can be hidden under cities or ruins. There are countless pyramids, temples, and villages to explore, with a grand total of 157 levels of play. It's a vast world—larger than *Ultima IV*.

With so many levels, there's no shortage of detail in the game. Be prepared to encounter a variety of monsters who vary in intelligence. Some simply charge into you blindly; others are more cunning and wait until you're vulnerable. The sun rises and sets, affecting how far you can see on the map. Even the phases of the moon change. Guards of the cities remember you if you've attacked someone inside, and chests, once emptied, refill slowly. Everything you do has an effect in the game, so be careful.

Combat itself is kept simple. Rather than using the kind of tactical maps found in *Ultima IV*, *Deathlord*'s combat is a simple *We swing, you swing* affair. There are enough weapons, armor, and magic spells (84 of them, in fact) to keep things from getting boring, and the

pace of combat is quick and dirty. Except for the disk access, which really isn't too bad, the entire game moves very quickly.

Instead of fighting every foe you meet, you can attempt to negotiate. The character may ignore you, take your gold and leave in peace, or take your gold and attack anyway. There are 128 different monsters, each with its own abilities and degree of nastiness.

The keyboard layout is acceptable but troublesome for those who are used to other fantasy games. All the keys have a function, but there are few intuitive links among them. The F key is used to search, for example, and M lights a torch. This means it takes a little time to learn how to use the various commands. One excellent feature is *Deathlord*'s use of macros. You can set up certain moves or cast spells at the tap of a function key. I keep all my healing spells in macros.

Deathlord is not the easiest fantasy adventure to survive. In fact, the game is extremely deadly. As you begin to explore this world, you can expect to lose your entire party several times. When a character is killed, the death is recorded on the disk—so back up your character disk frequently. Be especially careful when you leave land: It's easy to get lost on the oceans, and there's no way of determining where you are.

On the lower levels of play, *Deathlord* maintains its Japanese flavor, but, as the game progresses, there are more standard items and monsters. I would have preferred seeing the Japanese plot continued throughout.

The game also falls short when it comes to the clues you need to solve the many puzzles. Talk to everyone and be prepared to make a few educated guesses. Mapping, always important in fantasy games, is vital in *Deathlord*, where secret doors and fake walls can be anywhere. Search everywhere.

The manual is probably the worst I've seen from Electronic Arts. It's full of typos and bad grammar, and it gets downright confusing at times. Fortunately, none of these flaws are fatal. The game is addictive, and each time you discover something new, you'll find yourself diving right in. *Deathlord* isn't the most impressive adventure game—but it's a good one.

—Erik Olson

Deathlord
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
$29.95

Minimodem-C

Modems are a lot like automobile tires. They don't attract much attention as long as they do the job. It's only when they stop working or a problem develops that they get noticed.

For years, I was content with my poky 300-baud modem. It worked, so I never really gave it much thought. Most of my calls were to local bulletin boards, but since I don't upload or download many programs, speed was never much of a concern. I enjoy reading and posting messages—and 300 baud was all I needed.

Everything was fine until last year, when I was forced to use a different telephone company. I moved to a town whose telephone equipment is rumored to have been installed by A. G. Bell himself. Many BBS callers—including myself—complained about line noise garbling their messages. Some parts of town were affected more than others, but I discovered that callers using newer, 1200-baud modems seemed to have fewer problems. That's when I started noticing my old modem.

Enter the Aprotek Minimodem-C. This 1200-baud modem is impressive in every way. It's small enough to hide under a 3 × 5 card, but it's big enough to solve my telecomputing problems—without breaking my budget. With the Minimodem-C installed, I called the boards where line noise had been a problem. I'm pleased to say that garbled messages are now a thing of the past.

The Minimodem-C's circuitry effectively filters out most of the noise, and it was even able to connect with that obscure, distant bulletin board. Not only is the Minimodem-C four times faster than my 300-baud modem, but it also handles data transmissions more accurately. Since blocks of data come across with fewer errors, fewer retransmissions are required.

The Minimodem-C, which plugs directly into a 64 or 128 user port, comes with a seven-foot cable that connects to a standard telephone jack. There's nothing else to buy, and since it draws its power from the computer, you don't need an external power cord.

Despite the small size of the Minimodem-C, Aprotek has packed it with plenty of features. It works at 300 or 1200 baud, has autodial and auto-answer, touch-tone or rotary dialing, seven LED status lights, and a built-in speaker. It also supports a full range of AT dialing commands and includes other features.

I experienced no software compatibility problems, either. My favorite terminal programs run like a charm, since the Minimodem-C has two separate emulation modes: Hayes and Commodore 1670. I tried the modem with several popular public domain programs, and they all worked fine.

If you need a terminal program or want to upgrade your old one, you'll like *MultiTerm*, included with the Minimodem-C. This full-featured program comes in both 64 and 128 versions, and supports both Punter and XMODEM file-transfer protocols.

MultiTerm offers both ASCII and graphic terminal modes and permits multifile transfers, track-by-track transfers, and even whole-disk transfers. A built-in phone book with multidialing features lets you dial two to five numbers cyclically until a connection is made. This is a handy feature when you're calling several bulletin boards whose lines are frequently busy.

As an extra bonus, Aprotek provides an introductory subscription to CompuServe with every modem purchased. This includes a usage credit for about two hours of connect time.

The Minimodem-C comes with a one-year warranty, and Aprotek offers a technical-support telephone number in case you experience any problems with the modem or can't get it to work with a particular terminal program.

It's small enough to hide under a 3 × 5 card, but big enough in features to solve all my telecomputing problems—without breaking my budget.

In several weeks of use, the Minimodem-C has performed flawlessly. It dials numbers, reads and posts messages without garble, uploads and downloads programs without errors—everything I could ask of a modem. In fact, it works so well I no longer even notice it—and that's just the way I like it.

—Tom Netsel

Minimodem-C
Aprotek
1071-A Avenida Acaso
Camarillo, CA 93010
$79.95 **G**

JERICHO II

THE REVENGE

Robert Bixby

"Jericho II" picks up where the original "Jericho"—June 1988 *Gazette*—left off. This unusual game of *Breakout* has two players, four paddles, and more balls to deflect than in the original. Two joysticks required.

Last year, Jericho the supermoth broke into your competitor's kilt factory and—with a little help from you—consumed every scrap of fabric found in the warehouse. Now your competitor has devised a way to get even. In a one-on-one war of the kilts, you must fight to keep Jericho and his equally voracious friends within your opponent's facilities and away from your own.

"Jericho II" is a unique two-player variation of the popular *Breakout*-style game, in which you try to keep a ball bouncing inbounds until all the bricks on the screen are gone. In Jericho II, the balls are moths, and the bricks are colorful pieces of cloth.

Typing It In

Jericho II is written in machine language. Type it in using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you for starting and ending addresses, respond with the values given below.

Starting address: 0801
Ending address: 1518

Enter the data for Jericho II. Be sure to save a copy to tape or disk before you exit MLX.

When you're ready to play Jericho II, load and run the program. Although Jericho II is written in machine language, it can be loaded, saved, and run like a BASIC program.

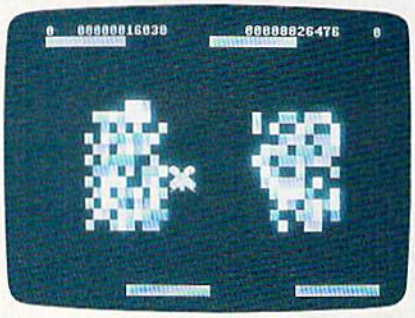
Pest Control

Plug one joystick into port 1 and another into port 2. When you type RUN, the game goes into demo mode, which is very much like the game itself. On each side of the screen is a piece of the cloth used to make the kilts. One belongs to you; the other belongs to your opponent.

Jericho the moth flaps around, soaring from place to place, until he bumps the cloth. He then eats a section and moves on. As Jericho takes a bite of fabric, the cloth changes color. When it turns orange, it's nearly eaten through.

Press any key to start the game. Each player has control over two large paddles—the joystick in port 1 controls the paddles on the left, while the joystick in port 2 controls the paddles on the right. Your paddles surround the fabric contained in your opponent's warehouse.

Joystick control is easy. Press the stick forward to move the paddles clockwise and pull back to move them counterclockwise.



It's men against moths in "Jericho II," a two-player flight of fancy.

Use the paddles to keep Jericho within your opponent's warehouse and away from your warehouse, located on the other side of the screen. The more pieces of fabric missing from your opponent's warehouse, the faster your score increases. To make things more difficult, Jericho is joined by several of his kilt-eating friends as the game progresses.

Each player has five warehouses' worth of fabric. When a player loses all of his or her fabric, the game ends and the player with the most points wins. The number of warehouses your opponent has lost and your total score appear at the top of the screen above your paddles.

See program listing on page 82. **G**

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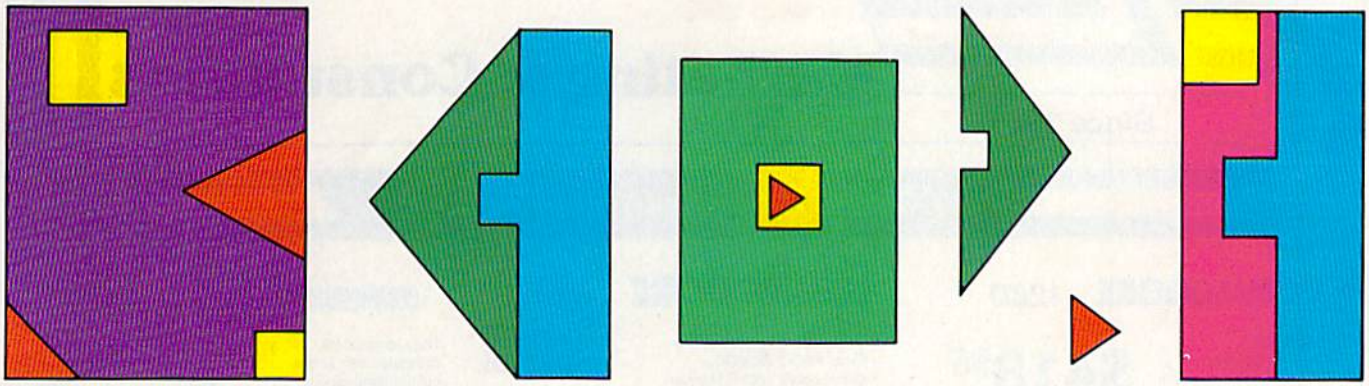


MATCH MANIA

Donovan E. Anderson, Jr.

Test your visual and mental perception with this mind boggler for one or two players. For the 64.

"Match Mania" presents a series of visual puzzles. Four rectangular patterns are drawn on the screen; three of them are identical, and one is slightly different. Your goal is to select the oddball pattern.

If the task sounds easy, consider this: A clock is counting the time and you're being judged not only on your accuracy, but also on your speed. Both one-and two-player games are included.

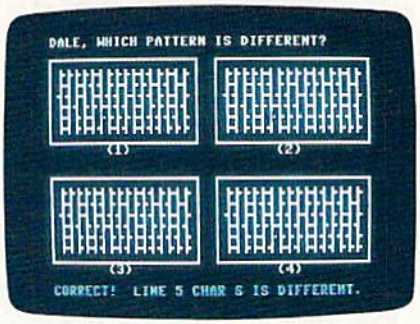
Getting Started

Match Mania is written entirely in BASIC. Using "The Automatic Proofreader" to ensure accurate typing, enter the program and save it to tape or disk. To play the game, load the program and type RUN.

Match Mania prompts you for the number of players. Enter 1 or 2, then press RETURN. Next, type in the players' names (also followed by RETURN). Now select the puzzle size. The greater the number of lines and characters, the more difficult the game.

If you choose to play the two-player game, you must decide whether you would like to have the winner judged by the number of correct responses or by the total elapsed time. Press C and the winner will be selected by the number of guesses (the lower the number of guesses, the better). Press T to choose a winner based upon total elapsed time (the less time, the better). If you select T, you can optionally request that a time penalty of 45 seconds be given to a player who makes an incorrect selection. This helps prevent players from making random selections to try to beat the clock.

The game begins after you've answered all the prompts. The first player's name will be shown at the top of the screen. That player should sit at the keyboard and wait for the puzzle to appear. The rectangles are numbered so that the pattern that doesn't belong can be indicated by typing its number. If the response is correct, the program tells how many seconds passed before the correct response was entered. Otherwise, the player gets another chance to guess. In the two-player game, players alternate turns.



Only one of these rectangles is unique. Spot the differences in "Match Mania."

The game continues indefinitely. To end the game, enter 0. A two-player game can be ended only on the first player's turn. The total points are displayed when the game ends.

See program listing on page 84. **G**

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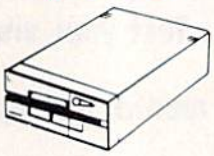

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Tired of buying yet another throw-away brick power supply for your Commodore 64? Go with the Micro R&D Power Supply. The MW 701-A features double fused systems, schematics, and a one-year warranty. Stay with the best, stay with Micro R&D.

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COMMODORE 1581 Disk Drive

Add more computing power to your Commodore with the 1581 Disk Drive. The 1581 features 3.5" 720K storage capacity and DS/DD. Add the 1581 on your Commodore today.

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EPYX 500 XJ Joystick

The Epyx 500 XJ scores significantly higher, faster, and easier than any joystick manufactured. The 500 XJ comes with palm grip and trigger finger firing. Break your previous record with the Epyx 500 XJ.
(Atari, C-64)

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MAGNAVOX CM 8762

The Magnavox CM 8762 14" monitor is the smart choice for your computing needs. Standard resolution is 640H x 240V. This monitor includes a built-in tilt stand plus a green text display switch. For a monitor with RGB TTL (CGA) and composite inputs, stay with the Magnavox CM 8762.

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Suggested use 128D or Colt PC.

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GoldStar, a name you can depend on, now provides the 2105 12" composite monochrome monitor for your computing needs. The GoldStar 2105 supplies a high resolution of 640H x 200V for IBM, Commodore, Apple and Atari computers with composite outputs. With your choice of either green or amber display, GoldStar's 2105 monitor will highlight your home or office computing needs.

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EPSON®

LX-800

For fast output and professional print quality, choose Epson's LX-800. This full featured 80 column printer has a speed of 180 cps (draft) and 30 cps (NLQ). Epson's exclusive SelecType front control panel lets you customize documents with popular type styles. The Epson LX-800 delivers affordable, professional printing for your home or office.

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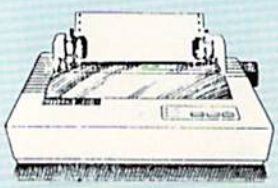
CITIZEN™

Citizen 120-D



If you are seeking world renowned printer performance for your home, look no further than the 120-D. Your data processing needs are handled quickly at a print speed of 120 cps (draft) or 25 cps (NLQ). The 120-D features 9 pin dot matrix print quality, standard parallel centronics interface and a 4K text buffer.

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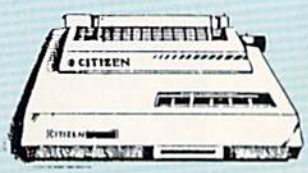
Citizen 180-D



You can always rely on the Citizen 180-D. From its price/performance value, to a print speed of 180 cps (draft) or 29 cps (NLQ) the Citizen 180-D is an excellent printer for the home or small business.

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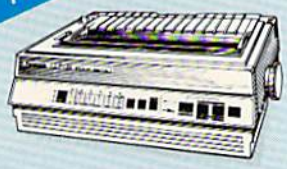

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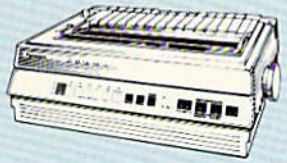
KX-P 1180

The 1180 by Panasonic offers you more than what you might expect in a low cost printer. With multiple paper paths, versatile paper handling, and front panel programmability through the EZ Set Operator panel, the 1180 is an excellent value. The 1180 also features 2 excellent print qualities: Near Letter Quality and Draft, with speeds up to 192 cps in Draft and 38 cps in Near Letter Quality plus crisp, clear graphics.



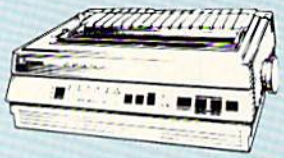
$319.95

KX-P 1124

For excellent print quality in a high speed printer, choose the KX-P 1124. Its 24 pin print head produces draft text at a quick 192 cps (draft) or letter quality text at 63 cps. In addition, the KX-P 1124 provides such standard features as selectable push/pull tractor, 5 resident print fonts, parallel centronics interface and a standard 6K buffer. Panasonic's KX-P 1124 ensures that your printing will be fast and professional.

KX-P1191

Announcing the Panasonic KX-P 1191, a 9 pin printer with advanced features that put it ahead of its class. The 1191 features the EZ-Set operator panel that lets you access the most commonly controlled printer functions right from the front panel. The 1191 has other advanced features, including an adjustable push/pull tractor feed and multiple paper paths. All these features come packaged in a rugged, ergonomic design with a two year limited parts and labor warranty.



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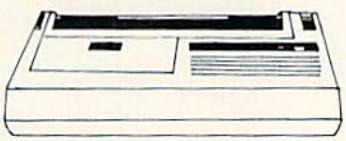
*quantities limited

Attention Bargain Hunters Panasonic 1091i Model II closeout! Call for details.

Okimate 20 Color Printer

OKIDATA



Imagine capturing the color capabilities of your computer and then printing those same screen images in vivid color. The OKIMATE 20 has digitally designed type fonts and a 24 element print head for near letter quality printing and full color graphics at an affordable price. Whether your printing needs require sophistication or fun-filled versatility, the OKIMATE 20 is the printer you have been looking for.

$138.95
(interfacing available)

Okidata 180

With a print speed of 180 cps draft or 30 cps for near letter quality printing, the high performance OKIDATA 180 will save time while making you more productive. OKIDATA makes printing easy with one-touch control plus standard COMMODORE and CENTRONICS parallel interfacing already included. Add up these superior features and you too will choose the OKIDATA 180.

$219.95

SEIKOSHA

SP1600AI

Stay ahead of the competition with Seikosha's SP1600AI printer, an excellent 9 pin dot matrix output at 160 cps (draft) and 40 cps (NLQ). Seikosha provides 8 kinds of dot addressable graphic printing.

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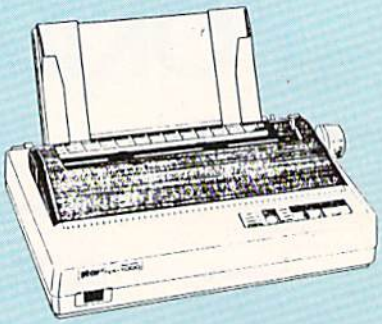
star micronics

NX-1000

$158.95

Star's answer to 9 pin dot matrix printers. A soft touch control panel and Star's paper park feature solves your multi-document needs. 144 cps draft and 36 cps NLQ give you high resolution 9 pin performance in an affordable package from Star.



Announcing STAR's NX-1000 Printer in 4 Models!

NX-1000c

With a Star NX-1000c printer your printing options will never cease to amaze you. The Star NX-1000c has standard Commodore serial interface for 64/128 computers. Print speed is selectable at 144 cps (draft) or 36 cps (NLQ) and paper parking will lend versatility to your document handling needs. The Star NX-1000c will fulfill your requirements to the letter.

$169.95

NX-1000 Rainbow

The Star NX-1000 Rainbow adds a whole new dimension to your work through multi-color printing. Star has designed 20 printing options into this printer. Add to this paper parking, Epson-IBM emulation, high resolution NLQ/graphics for a printer with extra talent over the competition. Star's NX-1000 Rainbow does all the work.

$217.95

NX-1000c Rainbow

Step into a world full of color with the Star NX-1000c Rainbow printer. Seven color printing is available along with the same standard features of all Star NX-1000 printers. Standard Commodore serial interface is included. Enhance your Commodore productivity with the Star NX-1000c Rainbow.

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GRAFIX CONVERTER

Steve Emsley

Because of the variety of storage formats used by 64 paint programs, a picture drawn in one paint program is often inaccessible to another. With this utility, you can use as many paint programs as you need to complete your masterpiece. For the 64 with a disk drive.

If you start drawing a picture with one paint program and then decide you'd like to use a certain feature of another, you usually can't just save it to disk and load it into the other program. Paint programs for the 64 have vastly different capabilities, and they use a large variety of storage formats.

"Grafix Converter" bridges the gap. It allows you to convert picture files from one paint-program format to another. Grafix Converter does have its limitations, however; it can't convert from hi-res to multicolor or vice versa.

Getting Started

Grafix Converter is a BASIC program. Be sure to use "The Automatic Proofreader," found elsewhere in this issue, while entering it. Save the program to disk before you attempt to run it. To begin, type RUN and press RETURN.

Grafix Converter first presents you with the main menu. Press 1 to convert a high-resolution picture file, 2 to convert a multicolor file, or 3 to quit. Grafix Converter can convert files from the following hi-res paint programs: *Doodle, Paint Now!, The Print Shop,* and *Art Studio.* It also supports these multicolor paint programs: *KoalaPad, Create with Garfield, Artist64, Rainbow Painter, Blazing Paddles, Advanced Art Studio,* and *Micro Illustrator.*

Once the format is selected, the program asks for the name of the paint program used to create the original file (FROM:) and the name of the one to convert to (TO:). Simply press the numbers corresponding to the correct programs. Next, Grafix Converter prompts you for the name of the original file. Type the name of the picture without any extensions. (For example, if you've saved a file from *Doodle!* with the name STUFF, it will appear in the disk directory as DDSTUFF. When prompted for the filename by Grafix Converter, you should enter STUFF, not DDSTUFF.) Grafix Converter prompts you for the new filename. Again, type the name without any extensions.

After you've entered the necessary information, Grafix Converter prompts you to place the source disk into the disk drive. Place the disk containing the original file into the drive and press RETURN. If you've changed your mind, press the left-arrow key to abort. The program reads the picture file and prompts you for the destination disk. If you press RETURN, the converted file is written to disk. If you press the left-arrow key, the operation is aborted. Grafix Converter returns to the main menu when it has finished.

See program listing on page 80. **G**

RAMDISK

David E. Bray

"Ramdisk" is a machine language program that turns your 64's unused memory into a superfast disk drive. Ramdisk has many of the features of a standard Commodore disk drive. You can load, save, and scratch programs from the ramdisk. You can get a directory of the files on the ramdisk. You can even append programs from the ramdisk to the program in memory. Ramdisk's one limitation is that it only works with BASIC programs and machine language programs that load like BASIC programs.

This machine language utility for the 64 creates a ramdisk in the RAM hidden beneath Kernal ROM. With it, you have 12K of temporary storage in which you can load and save programs instantaneously.

Typing It In

Ramdisk is written entirely in machine language, so you'll need to use "MLX," the machine language entry program found elsewhere in this issue, to enter it. When MLX asks for starting and ending addresses, respond with these values:

Starting address: 0801
Ending address: 0FE0

Be sure to save a copy to disk or tape after you've finished typing.

Although it's written in machine language, Ramdisk loads and runs like a BASIC program. To get started, load the program and type RUN.

Eight Commands

Ramdisk adds the following eight commands to BASIC. All of the commands work only in direct (immediate) mode. Optional command parameters are listed in brackets.

RSAVE "filename" saves the file in memory to the ramdisk. Ramdisk issues an error message if the filename already exists, if there's not enough memory for the program, or if the ramdisk directory is full. The ramdisk has room for 30 files in its directory. *Example:* RSAVE "RAMDISK"

RLOAD "filename" loads the specified file into the BASIC workspace. If the file is not on the ramdisk, Ramdisk returns a FILE NOT FOUND error message. You can use Commodore's standard wildcards within the filename. (A ? matches any single character and * matches any number of characters. For more information on using wildcards for pattern matching, consult the manual that came with your disk drive.) The first file that matches the pattern is loaded. *Example:* RLOAD "RAM*"

APPEND "filename" appends a program on the ramdisk to the end of the program that's currently in memory. APPEND works correctly only if the last line number of the program in memory is less than the first line number of the program being appended. Otherwise, Ramdisk prints an error message. As with RLOAD, wildcards can be used. If there's no program in memory, APPEND behaves just like RLOAD. *Example:* APPEND "SECONDFILE"

DIR ["file specification"] lists a directory of the files currently on the ramdisk. This directory appears exactly like that of a standard 1541 disk drive. The optional file specification can be a filename, with or without wildcards. If a file specification is given, only matching files will be listed. *Example:* DIR "SE*"

RLIST "filename" lists the specified file to the screen. The CTRL key slows the listing; SHIFT freezes it. The Commodore key aborts the listing. RLIST is useful for viewing a program without loading it into memory. If wildcards are used, only the first matching file is listed. *Example:* RLIST "RAMDISK"

DEL "filename" deletes the specified file from the ramdisk. Wildcards may be used to delete all matching files. Ramdisk prints the number of files that have been deleted when it's finished. *Example:* DEL "PROG??"

ERASE ["diskname"] erases the contents of the entire ramdisk. You'll be prompted with the question *Are you sure?* Answer Y (yes) or N (no). If a disk name is provided, the disk header will be renamed when the ramdisk is purged. Otherwise, it will remain unchanged. *Example:* ERASE "RAMDISK"

KILL disables the ramdisk. Use SYS 50688 to reenable it. To reenable the ramdisk with the previously saved files still intact, type SYS 50691. You won't be able to reenable the ramdisk if the memory where the program resides has been corrupted.

Remember that files in the ramdisk are not stored permanently. If you turn off the computer, the ramdisk is destroyed. To prevent losing valuable data, be sure to save copies of your programs to disk or tape.

See program listing on page 83. **G**

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Hi-Res 80 for the 128

Tony Phillips

Simplify your 80-column graphics with this short machine language program.

Many owners of the Commodore 128 realize that among the best features of their machine are the extended BASIC and 80-column hardware. However, because of the way the 80-column system is mapped in memory, the 128's extended BASIC doesn't support graphics on the 80-column screen. For this reason, programmers find it hard to generate bitmapped graphics on the 80-column screen. With "Hi-Res 80 for the 128," crisp resolution and a wide screen area are now available at your fingertips.

Typing It In

You'll need the 128 version of "MLX," the machine language entry program found in this issue, to enter Program 1. When you run 128 MLX, you'll be prompted for the starting and ending addresses of the program. These are the appropriate addresses for entering Hi-Res 80:

Starting address: **$1300**
Ending address: **$149F**

Once you've finished entering the program, be sure to save a copy to disk with the name Hi-Res 80. (The demonstration program expects to find a file with this name.)

Program 2, Hi-Res 80 DEMO, is a BASIC program that demonstrates how to use all the features of Hi-Res 80. Use "The Automatic Proofreader" while entering it to prevent typing mistakes.

Give It a Try

Load Program 1 with the statement

```
BLOAD"HI-RES 80"
```

and then enter this short demonstration program:

```
10 GRAPHIC1:SCNCLR:GRAPHIC0:
   DRAW 1,1,1 TO 320,200
20 DRAW 1,320,1 TO 1,200
30 SYS 4864,1,0,0:SYS 4864,0,40,0
```

Be sure that your computer is in 40-column mode before running the program. (See the owner's manual that came with your computer if you have trouble changing modes.) Run the program. If all goes well, you should see a screen full of garbage. The screen will clear and the program will draw a large X on first the left and then the right side of the screen.

Program the 128's 80-column graphics the easy way—with BASIC 7.0's built-in commands.

Hi-Res 80 works by transferring the 40-column bitmap screen to the 80-column chip's dedicated RAM. To use Hi-Res 80, draw your graphics image on the 40-column graphics screen; then use Hi-Res 80 to transfer the image to the 80-column screen. Since the 80-column screen is twice as wide, you may have to draw your image in sections and then transfer each section to the 80-column screen separately. See Program 2 for an example of how this is done.

Use the following command to transfer an image:

```
SYS 4864,clear,column,mask
```

The *clear* parameter can be 0 or 1. If it is set to 0, the existing 80-column bitmap will remain intact. If it is set to 1, the bitmap will be wiped clean before the transfer.

The *column* parameter can range from 0 to 40. This is the physical character column on the 80-column screen where the transfer will begin. To transfer a 40-column bitmap to the left half of the 80-column screen, use 0; for the right half, use 39.

The *mask* parameter can range from 1 to 3. This parameter tells the program how it should combine the current contents of the 80-column screen with the contents of the 40-column screen that you are stamping upon it. Set the mask to 1 to indicate an OR mask. This is the mask you will use most often. It simply stamps the 40-column image directly on top of the 80-column screen. Set the mask to 2 to use the bitwise AND function to superimpose two images. A mask value of 3 indicates the use of the bitwise EOR (Exclusive OR) function. (Refer to your owner's manual for more detailed information on the operation of OR, AND, and EOR.)

Hi-Res 80 transfers images in only one color. This is due to the memory constraints of the 80-column chip. Also, after any graphic transfer has been completed, the 80-column screen will be unusable for text because the bitmap corrupts the 80-column character definitions. This situation is easily remedied by either resetting the computer or by entering this line:

```
BANK 15:SYS 65378
```

With some experimentation, you should be able to make graphic displays that rival those of much more expensive computers.

See program listings on page 86. **G**

SPEEDCOUNT

Buck Childress

Students and writers are often expected to write a certain number of words. Whether it's a 200-word essay or a 2500-word research report, you can hit the mark exactly with "SpeedCount."

This utility patches into *SpeedScript* 3.2, causing it to display the word count at all times. The count appears in the upper right corner and is continuously updated. When you enter, erase, or delete words, the count changes instantly. Even when you load a file, the words are counted automatically.

Give your* SpeedScript *3.2 text files automatic word-counting capability as you write.

Getting Started

SpeedCount is a short (240 bytes) machine language routine listed as a BASIC loader. To avoid typing errors, enter it using "The Automatic Proofreader," found elsewhere in this issue. When you've finished typing, save a copy of the program to a disk containing *SpeedScript* 3.2. Note that your *SpeedScript* 3.2 file must be saved on this disk with the filename SPEEDSCRIPT.

When you run SpeedCount, it loads *SpeedScript*, patches in a machine language routine, and then runs the word processor. A zero appears, indicating that there are zero words in the file. Start typing and watch the count increase. Delete words, sentences, or paragraphs and watch the number decrease.

The changes made to *SpeedScript* are not permanent, so you must load and run SpeedCount whenever you want to use it.

See program listing on page 87. **G**

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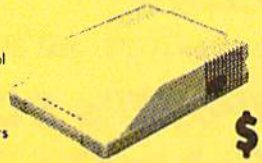

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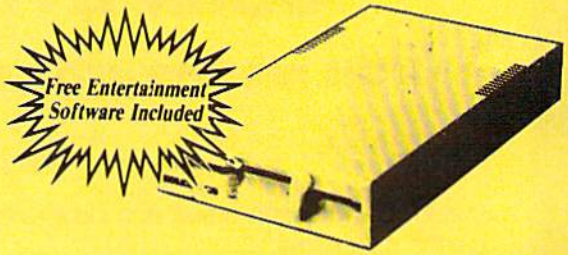

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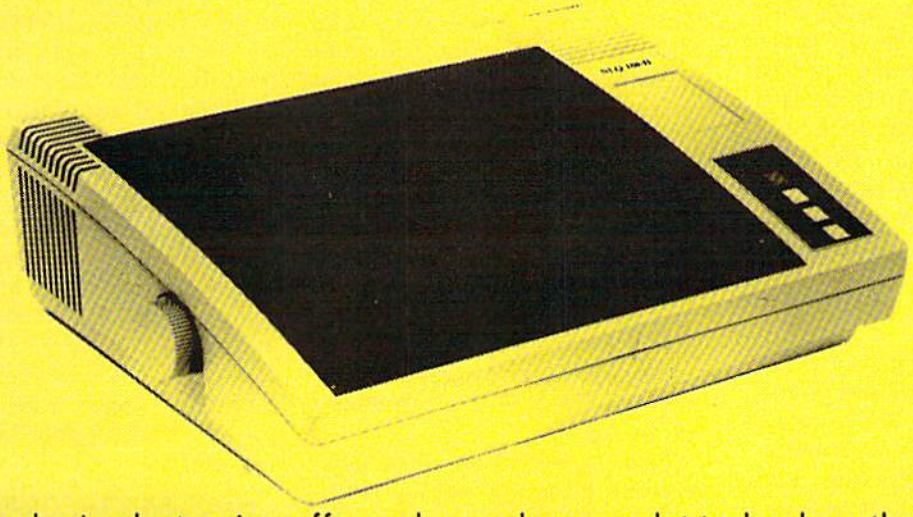

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THE geos column

Help Pad

Jim Tubbs

Get online help quickly and easily with this desk accessory for GEOS and GEOS128.

How many times have you been working hard on a term paper with *geoWrite* or writing the ultimate game with *geoProgrammer* when you found yourself flipping through the manual for some obscure bit of information? Wouldn't it be nice if you could just click a menu and have the manual pop up onto the screen? With "Help Pad," it can.

Help Pad consists of four programs: "Help Pad ML" and "Help Pad BASIC," which together make a desk accessory that allows you to display the help files you've created; "Help Grabber," a conversion utility for creating help files; and "Note Converter," a short desk accessory that modifies Notepad files to work with Help Grabber. A fifth program, "GeoConverter," converts these files into GEOS format.

Getting Started

Three of the programs are written in machine language, so you'll need to use "MLX," the machine language entry program, to type them in. The MLX prompts, and the values you should type in, are as follows:

Help Pad ML

Starting address: **$55FE**
Ending address: **$5BFF**

Help Grabber:

Starting address: **$0400**
Ending address: **$0957**

Note Converter:

Starting address: **$5000**
Ending address: **$5157**

When you have finished typing in Program 1, be sure to save it to disk with the filename HELPPAD.ML. When you have finished typing in Program 2 and Program 3, be sure to save two copies of each to disk. Save one copy of Program 2 with the filename HELPGRABBER.ML and one with the filename HELP GRABBER. Save Program 3 with the filenames NOTECONVERTER .ML and NOTE CONVERTER. One copy each of Program 2 and Program 3 will be converted with Program 5, "GeoConverter," our GEOS conversion utility. The other copies are suggested as backups in case anything goes wrong.

Now type in Program 4, Help Pad BASIC. Use "The Automatic Proofreader," found elsewhere in this issue, when you enter the program. Help Pad BASIC loads Help Pad ML, modifies it, and saves it as HELP PAD. HELP PAD will be converted with GeoConverter. Program 4 can be used to create another copy of HELP PAD if something goes wrong.

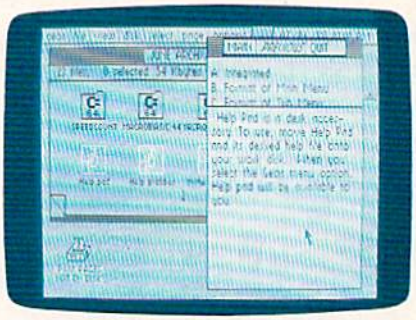
Now type in Program 5, GeoConverter. Be sure to use The Automatic Proofreader when you enter it. GeoConverter is used to make the program files into GEOS files. Save a copy of GeoConverter to your GEOS work disk.

Run GeoConverter once for Help Pad ML, once for Help Grabber, and once for Note Converter. You'll be prompted for a filename each time you run the program. Type HELP PAD for Program 1, HELP GRABBER for Program 2, and NOTE CONVERTER for Program 3. GeoConverter converts your files into GEOS files.

Building a Help File

The power of Help Pad lies in the fact that you can build your own help files. You don't need any programming tools; you need only know how to use *geoWrite* and the Notepad desk accessory. Help Grabber creates help files from files created with *geoWrite* 2.0 (or later) and the Notepad. Files created with *geoWrite* 1.3 will not work with Help Grabber. *geoWrite* 2.0 can be found in the *Writer's Workshop* package. *geoWrite* 2.1 is included with GEOS 2.0 and GEOS128 2.0. Notepad is included with all versions of GEOS.

Help Pad is menu-based. It requires that you have at least one main-menu entry. You can have up to 14 entries. Each main-menu entry must have 1–14 submenu entries. To create the menu files, load *geoWrite* 2.0 and create a file with any name you like. On page 1 of your document, type your main-menu entries. Be sure to place each entry on a separate line, pressing RETURN after each one. You must have least one entry and no more than 14. After you've typed the last entry and pressed RETURN, select PAGE BREAK from the PAGE menu. The page break must be on the line immediately following the last entry.



"Help Pad" puts GEOS instructions where they are most useful—on the screen.

Menu entries can be about 25 characters long. You may be able to make longer entries fit if they have a lot of narrow characters. You can spruce up your menu entries by using different text styles (bold, underline, and so on). Font changes and page-format commands are not supported and are ignored. If you want to indent your text, use the space bar. Tab characters are treated as page-formatting commands and are therefore ignored by Help Pad.

Once you have completed the main menu and have entered the

page break, you should be on page 2, ready to enter the submenus.

You must have one page of submenus for each individual entry in the main menu. For example, if you have six main-menu entries, you will need six pages of submenus. The submenus must be entered in the order in which they appear in the main menu. The submenu for the first entry of the main menu must be on page 2, the submenu for the second main-menu entry must be on page 3, and so on.

Type in the submenus the same way you did the main menu—each entry on a separate line, with a page break after the last entry. The last submenu must not have a page break after the last entry; the end of the document serves as the page break. When you have completed the submenus, you are ready to close your document. Be sure you have one page of submenu entries corresponding to each main-menu item.

The Text

Now you're ready to type in the actual help files using Notepad. As with submenus, you must have one Notepad file for each main-menu entry. Normally, this would be impossible because Notepad keeps only one file (called Notes) per disk. To compound the problem, the Notes file is a system file, so you can't rename it. Note Converter was written to overcome this limitation. Note Converter modifies the Notes file so that it can be renamed and used with Help Grabber.

To create your help files, select the Notepad desk accessory from the GEOS menu. The first Notepad file you create should correspond to the first entry in the main menu. You must create a page in Notepad for each submenu entry. For example, if your first main-menu entry opens a submenu with five entries, then your first Notepad file will require five pages.

When you have completed all the pages of the Notepad, close the accessory. Next, select the Note Converter desk accessory from the GEOS menu. When Note Converter has finished, find the Notes file and rename it with another filename, such as Notes1. You will need to use a unique name for each file. We suggest that you name each file NotesX, where X is a number that increases with each new file.

Once you've renamed Notes, you're ready to create the Notepad file for your next main-menu entry. Continue creating Notepad files and renaming them until you have a file for each main-menu entry.

When all your Notepad files are complete, make sure your *geoWrite* document and Notepad files are on the disk with Help Grabber and double-click the Help Grabber icon. You'll see a clear screen and a menu. Select OK on the menu. When the dialog box comes up, type a name for your new help file. Be sure you don't use the name of your *geoWrite* document or the name of one of your Notepad files.

From this point on, Help Grabber does the work. First, you'll see a dialog box containing the names of all the *geoWrite* files on the disk. Click on the file that contains your menu entries. Next, you'll see a dialog box that contains the names of all your Notepad files. Click on the file for the first submenu. The box will continue to pop up until you select a file for each submenu. Be sure to convert the Notepad files in the same order that they follow in the main menu (here's where numbering them helps). Help Grabber knows how many Notepad files need to be converted, and it alerts you when the last file is done. At this point, click on Quit to return to the deskTop.

Help!

You can now open the GEOS menu and select Help Pad. Once the screen is drawn, you'll see a blank pad on the right side of the screen with a menu at the top. There are three choices: Main, Previous, and Quit. Clicking on Main brings up the main menu, Previous returns to the previous menu, and Quit exits Help Pad.

When you first open Help Pad, only the Main and Quit options are active. Click Main to go to the main menu. If the menu fails to appear, be sure that your help file is on the disk. The main menu is a list of submenus. Using your mouse, click on one of the menu items. This displays the submenu. Again, make a selection. This time, the information you request appears on the pad. After you've read the text, you can recall the last submenu by selecting Previous, go back to the main menu by selecting Main, or exit the desk accessory by selecting Quit.

Hints and Tips

If your menus fail to appear when you click Main or a main-menu entry, be sure that the help file created by Help Grabber is on a currently logged disk (a disk whose name appears under one of the icons in the upper right corner of the deskTop screen). If the file is there but there are still no menus, go back and examine the menu file that you created with *geoWrite*. Be sure that page 1 contains the main-menu items, each on a separate line. Also, make sure that the page break is on the line immediately following the last menu entry.

If your text isn't appearing under the right submenu, or if you have blank or missing pages, look at your Notepad files. Be sure that the text for your first submenu entry begins on page 1 and that your Notepad files have the exact number of pages (one page for each entry in the corresponding submenu). Be careful not to add a page by flipping past the last page in Notepad. Also, make sure that you're selecting the Notepad files in the right order when using Help Grabber.

If you want to change one menu entry, you don't need to change the Notepad files; simply change the menu file and run Help Grabber again. Only if you change the order of the submenu entries or the number of submenu entries will you have to change the Notepad files. If you change anything, however, you'll have to use Help Grabber again.

Help Pad files can get very large—up to about 50K. If your system is configured with two drives, you can have Help Pad on your work disk and the help file on your data disk. This is practically essential if you are using *geoPublish* or *geoProgrammer*.

If you want to use Help Pad in your own applications, you need to be aware that Help Pad alters the computer's color map. If your application makes use of color memory, the routine that calls the desk accessory should first save the color memory either as a temporary swap file to disk or in its own internal 1K buffer.

See program listings on page 78. **G**

feedback

Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, North Carolina 27403. We regret that, due to the volume of mail received, we cannot respond individually to programming questions.

Stereo SID Chips Revisited

In the March "Feedback," we cited an article by Mark A. Dickenson in the Diablo Valley Commodore Users Group newsletter "Open Forum" that provided instructions for installing a second SID chip in a 64. It has recently come to our attention that the hardware modification described by Mr. Dickenson has been incorporated into a commercially available cartridge for both the 64 and the 128. To find out more about this device, see "In Stereo" in this month's installment of "Commodore Clips."

64/PC Compatibility

I own a 64 and love it. My husband wants to get an IBM PC compatible, but I don't want to give up my 64 or my desk. Will there ever be a computer that is 64 and IBM switchable? Even if it requires two different disk drives, it would be worth it. Is it even possible?

Janice Lisena
Melrose Park, IL

It's possible to create an IBM PC–compatible computer that also runs Commodore 64 programs, but the result would not be entirely satisfactory. The hardware of the two machines is so different—different microprocessors (the brains of the computer), different disk formats, and so on—that for one computer to properly emulate the other, you'd have to cram the two machines into one case. As a result, the cost of such a computer would most likely be the same as, if not more than, the cost of buying the computers separately.

Software emulation (where one computer uses a program to run the software of another computer) is really not feasible in this case. The 64 would be incredibly slow at emulating the PC's 8086 instruction set and BIOS routines while the IBM PC would be sorely inept at generating such basic 64 features as colors, sprites, and sound.

Besides the technical difficulties, however, computer manufacturers don't seem interested in creating an IBM PC/Commodore 64 clone. If you want to run both PC and 64 software, you'll have to buy two separate systems and do your best to make room on your computer desk.

If you're concerned about the cost of duplicating your current peripherals, remember that PCs and 64s are capable of sharing certain devices. As long as you purchase a monitor that supports both composite input (for the 64) and digital RGB input (for the PC)—such as Commodore's 1084S—both computers can use the same monitor. With a serial interface for your 64, the computers can share an external modem. And if your printer has a standard Centronics parallel port, it, too, can be used by both the PC and 64.

Self-Modifying BASIC

I'm trying to write a BASIC program called GREETING that keeps a tally of the number of times it's been run. I want GREETING to display some graphics if it's been run four times and to run a program if it hasn't. So far, I've been unable to get it to update successfully and resave itself.

Here's the part of the program where I'm having trouble:

```
10 C=0:REM NUMBER OF TIMES
   PROGRAM HAS BEEN RUN
20 IF C=4 THEN GOTO 60
30 C=C+1:PRINT:PRINT "10 C="C
   CHR$(13)
40 OPEN 15,8,15,"S0:GREETING":CLOSE
   15:SAVE "GREETING",8
50 LOAD "FILENAME",8
60 REM START OF GRAPHICS
   ROUTINE
```

What's wrong?

Robert A. Weeks
Union Bridge, MD

You're on the right track, but line 30 has a problem. You can't change a program line simply by printing it to the screen, even if it's followed by a CHR$(13). The computer recognizes that it's not in immediate mode and will refuse to enter the line. There are two ways you can fix this: You can use a method called the dynamic keyboard, *or you can use the machine language utility "Rewrite" that accompanies this issue's "The Programmer's Page."*

The dynamic-keyboard method utilizes the computer's keyboard buffer to simulate keypresses. By POKEing characters into this buffer—located at 631 on the Commodore 64 (842 on the Commodore 128)—and then POKEing the number *of characters into location 198 (208 on the 128), you can fool the computer into thinking that someone is actually typing on the keyboard.*

To update your program using the dynamic keyboard, you should print the modified line 10 to the screen (as you already are doing), print the command GOTO 40 just below that, move the cursor back on top of line 10, stuff the keyboard buffer with two RETURNs—CHR$(13)—and then exit the program to enter immediate mode; let the computer do the rest. With two RETURNs waiting in the keyboard buffer, the computer will enter line 10 and then jump back into the program via the GOTO statement. All this can be achieved by adding the following line to your program:

```
35 PRINT "{UP}GOTO 40{UP}{UP}
   {UP}";:POKE 631,13:POKE
   632,13:POKE 198,2:END
```

The dynamic keyboard is indis-

pensable for some uses. However, when you use it to change program lines, all of your variable definitions are cleared. The program Rewrite found in this issue's "The Programmer's Page" allows you to modify BASIC lines from within a program and still keep your variables intact.

To use Rewrite, enter the command

```
SYS 828,line number,new line$
```

where line number *specifies the BASIC line that you wish to change and* new line$ *specifies what you want to change the line to. For example, to use Rewrite with your GREETING program, change line 30 to read*

```
30 C=C+1:SYS 828,10,"C="+STR$(C)
```

In order for this line to work correctly, you'll need to load and run Rewrite's BASIC loader or include the BASIC loader in your own program. See "The Programmer's Page" for more information.

Another BASIC Editor

I'm trying to write a program that will convert a *SpeedScript* 3.2 text file into a BASIC program using the method discussed on page 94 of the *Commodore 64 Programmer's Reference Guide.*

So far, I've had little success. Can you help me?

D. R. Cool
Huber Heights, OH

The method you're referring to—the dynamic-keyboard *technique—was discussed in the previous response. By using this technique, you can add, delete, or modify program lines while a program is running.*

The following program uses the dynamic keyboard to convert a SpeedScript *file into a runnable BASIC program.*

```
PE 10 FORI=828TO920:READA:POKE
      I,A:X=X+A:NEXT:IFX<>1172
      0THENPRINT"DATA ERROR":S
      TOP
XB 20 DATA 76,93,3,76,204,255
XS 30 DATA 133,251,41,64,10,5
BG 40 DATA 251,41,191,133,251,
      41
AG 50 DATA 32,73,32,10,5,251
FX 60 DATA 201,95,208,2,169,13
JB 70 DATA 133,251,96,32,225,2
      55
PB 80 DATA 240,221,32,135,3,20
      1
FR 90 DATA 13,208,2,169,31,72
CB 100 DATA 41,128,74,133,251,
      104
JS 110 DATA 41,63,5,251,133,25
      1
JC 120 DATA 32,183,255,72,32,1
      43
MJ 130 DATA 3,104,41,64,240,21
      7
MX 140 DATA 76,204,255,162,1,3
      2
PX 150 DATA 198,255,76,207,255
      ,162
PC 160 DATA 2,32,201,255,165,2
      51
AH 170 DATA 76,210,255
PP 180 INPUT"{DOWN}{N}INPUT FI
      LE NAME";I$
MQ 190 INPUT"{DOWN}OUTPUT FILE
       NAME";O$
CA 200 DV=8:SA=7
JK 210 OPEN15,8,15,"I0":REM RE
      MOVE ,"I0" IF YOU'VE CH
      ANGED THE DRIVE'S SPEED
EG 220 OPEN1,8,3,I$:INPUT#15,E
      N,EM$:F$=I$:IFEN=0THEN2
      50
DX 230 PRINT"{DOWN}DISK ERROR
      {SPACE}FOR ";F$:PRINTEM
      $
CJ 240 PRINT"{3 DOWN}RUN{3 UP}
      ":CLOSE1:CLOSE2:CLOSE15
      :END
QQ 250 OPEN2,DV,SA,"0:"+O$+",P
      ,W":INPUT#15,EN,EM$:F$=
      O$
EH 260 IFEN=0THEN320
EJ 270 IFEN<>63THEN230
RX 280 PRINT"{DOWN}";O$;" EXIS
      TS... REPLACE? {RVS}Y
      {OFF}/{RVS}N{OFF}:"
PF 290 GETA$:IFA$<>"Y"ANDA$<>"
      N"THEN290
PX 300 IFA$="N"THEN240
JC 310 PRINT#15,"S0:"+O$:CLOSE
      2:GOTO250
GS 320 SYS828:IF(PEEK(144)AND1
      91)=0THENPRINT"{DOWN}DO
      NE.":GOTO240
SJ 330 PRINT"I/O ERROR DURING
      {SPACE}CONVERSION.":INP
      UT#15,EN,EM$:IFEN<>0THE
      N230
FJ 340 GOTO240
```

To begin, type in this routine and save it to disk. Then, load and run SpeedScript *and enter the text of your BASIC program. Keep the following rules in mind:*

- *Every program line must have a line number.*
- *No line number can be higher than 63899.*
- *Each program line can be no more than 80 characters long and should end with a carriage return.*
- *Control characters like {CLR} or color codes must be entered from* SpeedScript *as* format commands. *(Press CTRL-£ and then enter the control character.)*

When you've finished, save the program as a normal SpeedScript *file (using f8), exit the word processor, and run the above converter. At the prompt, enter the name of the text file that you just saved. The converter reads a line at a time from the file on disk and POKEs it to the screen. It then executes a carriage return over the line, thus adding it to the program in memory.*

When the entire file has been processed, the converter automatically deletes itself, leaving only the converted BASIC program in memory. Be sure to save this program.

Sound Advice

I have a Commodore 64 with a monochrome monitor. Unfortunately, the monitor has no speaker. Is there some way I could hear the computer's sound by attaching auxiliary speakers or the like?

Sanjoy Dasgupta
New York, NY

There are several ways you could do this. One way would be to take a standard Commodore monitor cable (available from your local Commodore dealer or from mail-order companies such as Jameco, 1355 Shoreway Road, Belmont, California 94002, 415-592-8121; or Software Support International, 2700 NE Andresen Road, Vancouver, Washington 98661, 800-356-1179) and connect its audio output line to the auxiliary jacks of your hi-fi system via a Y-splitter. This would give you sound through both speaker channels, although it wouldn't be stereo.

Another alternative would be to connect the audio output line to a small amplifier/speaker unit such as the one available from Radio Shack (catalog number 277-1008B or 277-1008C).

A Bit of Mystery

I was recently looking through the memory map of the I/O addresses described on page 322 of the *Commodore 64 Programmer's Reference Guide.* I noticed that opposite bit 5 of location 53270, in large bold letters, was the statement: ALWAYS SET THIS BIT TO 0! What happens when this bit is set to 1? Will setting it damage my computer?

Stuart Smith
Calgary, Alberta

Rest assured: There's no way you can damage your 64 by POKEing. Location 53270 happens to be a VIC-II chip control register having several bitwise functions. Bit 5, in particular, supposedly turns the video signal on or off. On older 64s, setting this bit would completely blank the screen. But on newer 64s, this bit has no apparent effect on the video output. **G**

BASIC for beginners

Bugbusters

Larry Cotton

Writing BASIC programs is exciting, but it can also be extremely frustrating at times. For every hour you spend in deciding how to accomplish a certain task and writing the code, you probably consume another hour or more in debugging (finding errors) and honing your masterpiece.

This month we'll consider several BASIC debugging aids: STOP, CONT, REM, and PRINT. We've looked at two of these before—REM and PRINT—but not in the context of debugging.

Some Typical Blunders

First, let's create an error:

```
10 PRINTENTER NAME"N
```

Actually, we've created at least four errors in this one-line program. If you attempt to run it, the first error is immediately obvious—a 0 and an *N* print instead of the intended message. Why?

First, quotation marks are missing before *ENTER*, so the computer thinks ENTER is the name of a numeric variable. Since only the first two characters of any variable name matter, the computer searches for the value of variable EN. Finding none, it prints 0. When it gets to the quotation mark, it thinks there's a message coming and prints *N* as its first (and only) letter.

How do you spot an error like this? First, you must know what it is that you want to print. A literal string, such as ENTER NAME, requires quotation marks on both ends of the phrase if it's followed by any other information. Only when a PRINT statement is the *last* thing on a logical line can the ending quotation mark be omitted. But be careful with this shortcut.

To fix the error, add a quotation mark between PRINT and ENTER; then run the program again. You are immediately rewarded—your message prints. But what's the 0 right after it? And what are we trying to do here, anyway? Aren't we actually trying to gather user input? If so, we must use the INPUT statement, not PRINT:

```
10 INPUT"ENTER NAME"N
```

What happens when we run this one-liner? Syntax error! INPUT requires a semicolon between the last quotation mark of any message and the variable name. Put one in and run it again.

Redo from Start

Aha! The requisite question mark and a blinking cursor. Great. Your problems are over, right? Not quite. Type any name and press RETURN. A new error message has been printed unmercifully on the screen by your once-friendly computer: REDO FROM START, followed by a repeat of your message.

If you've never seen this one before, it can be very disconcerting. Redo what from start? The program? The question? The answer? What this means is that the computer expected a number, but the user entered letters instead. If the programmer really wants letters, he or she must use N$ instead of N. The correct line is

```
10 INPUT"ENTER NAME";N$
```

Is programming always this grueling? No. You learn from your mistakes, and the next time you program, you'll remember the correct syntax. While we're on the subject of the infamous REDO FROM START error, a friend of mine at work was demonstrating a program he'd written on his 64 at home. His program contained an input statement something like this:

```
100 INPUT"PLEASE SELECT 1, 2, 3, 4, 5,
    OR 6 AND PRESS RETURN.";R
```

When confronted with what looks like perfectly normal syntax, the computer retorts "REDO FROM START" no matter what is typed, numbers or letters. And the strangest part: His program had worked perfectly for him the night before.

Apparently, some of the earlier 64s contain an internal bug—yes, even computer designers err—which causes the INPUT statement to reject a legitimate entry if the input line is over one screen line long and the cursor is forced past the first position of the second line.

My friend's computer, a 64C, does not suffer from the same malady. Neither does my newer 64. But my oldest one—bought in 1982—succumbs to the same REDO FROM START fate. Moral: Limit your INPUT statements to less than one screen line in length.

Pull Out the STOPs

How can STOP, CONT, REM, and PRINT help to bust bugs? Go back to our first error-laden line. Insert STOP and a colon between the line number and PRINT:

```
10 STOP:PRINTENTER NAME"N
```

When you run it, you'll immediately see BREAK IN 10, READY, and the familiar blinking cursor. At least there are no syntax errors. Now type CONT and press RETURN (CONT is BASIC for CONTinue). Our program continues where it left off and the original errors recur.

STOP and CONT are often used together to isolate software bugs. The technique is to put the STOP and colon just before a suspected bug, run the program, type CONT, press RETURN, and watch what happens. If this doesn't trap the bug, move STOP to another place in the program.

STOP behaves like END; the main difference is that STOP inserts the message BREAK IN XXX before READY and the blinking cursor. You can even use END in place of

STOP. Although you won't see the message BREAK IN XXX, the program can still be CONTinued.

To Be CONTinued

CONT works only if all of the following are true:

- You ran the program with RUN.
- You haven't pressed the RUN/STOP–RESTORE key sequence.
- You haven't created another syntax error by misspelling CONT.
- You haven't edited the program.

While on the subject of error messages, it might be a good idea for you to familiarize yourself with some of them. A complete list can be found in an appendix in either your *User's Guide* or the *Programmer's Reference Guide*.

The most common error message, of course, is the cryptic SYNTAX ERROR IN XXX. Offering little insight, the computer simply tells you that a syntax error occurred in a particular line—not what the error is. (See below for cases where even this doesn't work.)

Typos

Actually, most syntax errors can be traced to a simple typing error. For example, a BASIC keyword is spelled wrong (*PIRNT* instead of *PRINT*). The most bedeviling error occurs when you accidentally type the *number* 0 instead of the *letter O* or vice versa. Many programs contain a lot of POKE statements (to be covered next month), such as

```
10 POKE 53280,0:POKE 53281,0:P0KE
   646,1
```

The more POKE statements there are, the harder it is to spot a 0 among the *O*'s. In the above line, it's in the third POKE. Again, this error could be isolated by selectively using STOP:

```
10 POKE 53280,0:POKE 53281,0:STOP:
   P0KE 646,1
```

A REMarkable Bugbuster

How can you use REM as a BASIC debugger? You can insert REM to make the computer deliberately skip something, as in this example, using the previous program line:

```
10 POKE 53280,0:POKE 53281,0:REM
   P0KE 646,1
```

This time, instead of the program halting in its tracks, it blows past the REM to the next line. Great! No syntax error. Then, go back and look closely at the syntax after the REM. Hopefully, you'll discover that you typed the number 0 instead of the letter *O*.

What's My Line?

Previously in this column, we've encountered two error messages that give programmers headaches. Both point to a line other than the one that contains the error.

The first occurs when you try to execute a user-defined function—for example, DEF FN A(X). If there's a mistake in the function definition, the computer discovers this error only after the function is called. And, it tells you that the error occurred in the current line rather than the line where the function was defined. (See the February 1989 column for further details.)

The second error message that misdirects you occurs with the READ statement. If the computer attempts to READ data but finds none or finds a syntax error in the data line (for instance, *DATA* spelled *DATE*), the OUT OF DATA ERROR IN XXX message prints. The line mentioned in the error message is the line that's *READing* the data, not the DATA line itself. This error was discussed in the August 1987 column.

Math Errors

Math errors can often be debugged by using a combination of STOP and PRINT. If you expect the computer to calculate a certain value and it doesn't, you need to pull out a few STOPs. For an example, type:

```
10 A=4:B=6:C=3
20 D=A+B*C:E=D/2
30 PRINT E
```

Before you run it, guess the value of E: 15? 11? Now run it. If it's not what you expected, insert a STOP in line 20 before E is calculated:

```
20 D=A+B*C:STOP:E=D/2
```

Run the program again. When you see BREAK IN 20, type

```
PRINT D
```

from immediate (direct) mode.

D must be correct before E can ever be correct. The value for D will be 22.

We've touched on just a few of the bugs likely to be encountered in BASIC programming; we'll deal with more in the coming months. **G**

bug-swatter

In last month's column, we stated that several readers had experienced problems with "Monthly Calendar" (March 1989) and that the program works correctly with Commodore printers. This program has been particularly troublesome to some printer/interface combinations. It seems that a number of Commodore-compatible printers and many interfaces that emulate Commodore printers simply can't handle Monthly Calendar. Since the last issue went to press, we've received dozens of letters every day about Monthly Calendar. So many readers have asked for solutions to make Monthly Calendar work with their printers that we've worked on a modification that, to our knowledge, will work with any Commodore-compatible printer or interface. Substitute the following six lines for those in the original listing.

```
DP 900 CS=INT((80-LEN(HD$))/2)
MR 990 GOSUB2100:CLOSE5:OPEN5,
       4,6:OPEN4,4:PRINT#4,RE$
       ;LEFT$(SP$,CS);HD$;RE$;
HD 1100 PRINT#4,"-";DA$(D+Z);C
       HR$(16)+TB$;
AP 1815 HD$(HH)=LEFT$(SP$,11-L
       EN(HD$(HH))/2)+HD$(HH)
RE 1860 L$(2)=RE$+"-"+HD$(1)+C
       HR$(16)+"22-"+LEFT$(SP
       $,14)+"MEMOS"
FG 1870 L$(2)=L$(2)+CHR$(16)+"
       55-"+HD$(2)+CHR$(16)+"
       77-"
```

Plus/4 owners can use Monthly Calendar with minimal changes. Change lines 150, 2070, and 2680 as follows:

```
RD 150 COLOR 0,2,3:COLOR4,2,3
PF 2070 COLOR 4,14,6:COLOR 0,7
       ,6:PRINT"{CLR}{7}";:CL
       R:END
SP 2680 T=X+Y*40+3192:IF X=W T
       HEN T=T-X+40
```

The other Plus/4 changes involve the variable DS. DS is a reserved variable on the Plus/4 and must be changed to another variable name. Change DS to DR in lines 770, 780, 820–840, 860, 1130, 1310–1420, and 1770–1800. Thanks to reader Charles H. Nash, Jr. for these modifications. **G**

power BASIC

128 Monitor Enhancer

Shawn K. Smith

Add four useful commands to the 128's machine language monitor and give it bidirectional scrolling, disk-editing capabilities, and a FAST-mode toggle for full-speed 80-column computing.

One of the 128's strongest features is its built-in machine language monitor. This monitor offers many standard commands, including hunt, fill, assemble, and disassemble. Nevertheless, there's still room for improvement. For instance, the 128 monitor doesn't support bidirectional scrolling, nor is it capable of reading from and writing to a specific disk sector. But now there's "128 Monitor Enhancer"—a RAM-based monitor extension which gives you all of the aforementioned features and more.

Getting Started

128 Monitor Enhancer is a short (964 bytes), relocatable machine language program written in the form of a BASIC loader. To avoid typing mistakes, enter it using "The Automatic Proofreader," found elsewhere in this issue. Be sure to save a copy of 128 Monitor Enhancer to disk or tape before you run it.

Before you use the 128's machine language monitor, load and run 128 Monitor Enhancer. The program will display the prompt *STARTING ADDRESS? $1400*. If this address is suitable for your current application, simply press RETURN. Otherwise, enter another address; you can express this address in decimal or hexadecimal notation. If you choose hex, be sure to precede the address with a $.

After you've chosen a starting location, the BASIC loader POKEs the machine language routine into memory and activates it using a SYS command. In case you want to save 128 Monitor Enhancer as a BLOADable machine language file, the loader displays the starting and ending addresses for the routine. You may use these numbers to BSAVE the program to disk.

Scrolling and FAST Mode

Once the program is enabled, four additional monitor commands are available. To see each in action, first enter the monitor by pressing F8 or typing MONITOR.

The new command that you'll probably use most often is bidirectional scrolling. To activate this function, enter B and press RETURN. (To turn it off, enter B a second time or exit the monitor with the X command.) With bidirectional scrolling activated, you can use the cursor keys to scroll backward and forward through a disassembly (D command) or memory dump (M command). The cursor must be in the far left column when you hit the cursor-up or cursor-down keys for bidirectional scrolling to work.

The £ command toggles the microprocessor between SLOW (1 MHz) and FAST (2 MHz) mode. The first time you use this command, the computer is placed in FAST mode; the second time, it returns to normal operating speed. Since the 40-column screen is turned off in FAST mode, this command is useful only if you're working in 80-column mode.

Reading and Writing

The remaining commands, !R and !W, allow you to read from or write to any disk sector using a 1541, 1571, 1581, or compatible disk drive. The !R command reads the selected sector (256 bytes) into the cassette buffer at $0B00 (2816). The !W command does just the opposite: It writes 256 bytes from the cassette buffer to the given disk sector.

The read command uses the following format:

!R*track sector [device number]*

The *track* and *sector* values can be in hexadecimal or they can be expressed using the monitor's own numbering conventions. The *device number* is optional; if none is given, it defaults to 8. To read track 18 ($12), sector 1 from device 8, for example, you enter !R12 01.

The syntax for the !W command is the same as for the !R command:

!W*track sector [device number]*

When writing to the disk with the !W command, exercise extreme care. Be aware that any changes you make to a disk may damage one or more of the files. Also, to be on the safe side, the first time you use the !W command, try it on a scratch disk. Only when you're sure that the command works properly should you use it on your other disks.

Program Notes

Enhancer works by redirecting the monitor's command-evaluation vector at $032E (814) to itself. Thus, whenever you enter a command from the monitor, the routine first checks to see if it's one of 128 Monitor Enhancer's four commands. If it is, the program executes the necessary code. Otherwise, it exits through the normal command-evaluation routine.

Bidirectional scrolling is achieved by similar means: The program wedges the command into the keyboard-scanning routine at $033C (828). Unfortunately, this approach results in a slight timing problem. On occasion, as you're cursoring around the screen, an inverse space is left behind. (This occurs only on the 40-column screen.) Fortunately, this minor glitch has no effect on the program's operation.

See program listing on page 77. **G**

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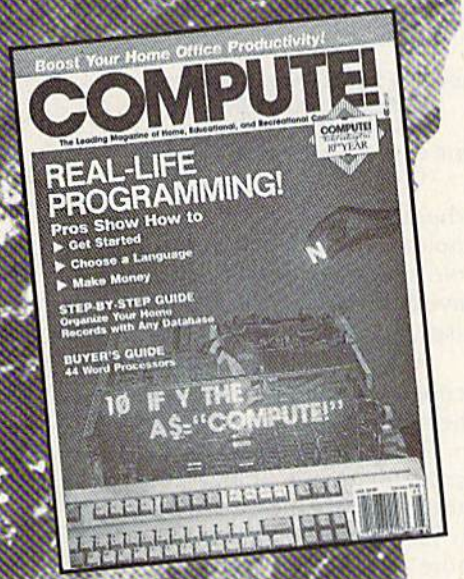

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THE programmer's page

Self-Modifying BASIC

Randy Thompson

The technique is unconventional and the results are often unpredictable. It's been called sloppy—even dangerous—and many programming manuals tell you not to do it. But sometimes it's the most effective way to get something done. If you haven't guessed what *it* is, I'm talking about self-modifying code—programs that actually rewrite themselves as they run.

Self-modifying code is common in machine language. The 64's CHRGET routine, which the computer uses to read BASIC commands, is a prime example. Located in memory at 115 ($73), CHRGET alters the operand of a LDA instruction in order to get the next character in a BASIC line. The same task could have been performed differently but not more efficiently.

While it's easy to write self-modifying programs in machine language (even if by accident), it's difficult to do so in BASIC. With machine language help, however, it can be done. Presented here is a short machine language routine I call "Rewrite." Rewrite gives you the power of self-modifying BASIC, allowing you to edit lines *while* your program is running.

Rewrite is listed as a BASIC loader. To ensure accurate typing when you enter the program, use "The Automatic Proofreader," included in this issue. If you like, you can change Rewrite's starting address by changing the number in line 100.

Self-Modifying BASIC

To use Rewrite, enter the following SYS from within your program (the SYS address will change if you alter the program's starting address):

```
SYS 828,line number,new line$
```

The *line number* parameter specifies the BASIC line that you wish to change and *new line$* specifies what you want to change the line to. For example, to change line 20 to read FOR I=1 TO 100:NEXT, enter the command SYS 828,20, "FOR I=1 TO 100:NEXT".

There are a couple of limitations that you should be aware of. First, you cannot *add* program lines with this routine, you can only change them. If the specified line number does not exist, the program aborts with an UNDEFINED STATEMENT ERROR. Second, you cannot expand the size of a BASIC line. Your new line must fit within the current line size or it will be truncated. (Keep in mind that, because of BASIC's tokenization process, you can't just count the number of characters on the screen to determine the current size of a line.) For this reason, it's a good idea to enter long REM statements into lines that you know you will be modifying later.

What Is It Good For?

Self-modifying code is a strange concept, and you can do some pretty strange things with it. I'll try to confine myself to practical examples here, but don't let that limit your creativity.

The first example that comes to mind is a calculated GOTO, where the line number following a GOTO instruction is calculated by the program. To do this, simply set the variable L equal to the line number that you wish to go to and execute the following code:

```
10 SYS 828,20,"GOTO"+STR$(L)
20 REM THIS LINE WILL BE
   MODIFIED BY LINE 10
```

See how it works? By the time the program reaches line 20, line 10 has changed it into a GOTO statement. You can use the same technique to perform calculated GOSUBs, too.

Ever try to write a program that evaluates mathematical expressions, such as a plotting program that accepts formulas input by the user? Here's a short routine that makes BASIC do all the work:

```
10 INPUT "FORMULA";F$
20 SYS 828,30,"PRINT "+F$
30 REM THIS LINE WILL PRINT
   THE FORMULA RESULTS
```

This program calculates formulas entered by the user. Although simple in operation, it would be a long, complicated program without self-modifying code.

Customizable Programs

Let's say you're writing a program that allows the user to modify the screen colors. There's a problem, however. The program resorts to its default colors every time it's run. How do you get around this? Use Rewrite to hard-code the user's choice of colors and then save the program back to disk. For example, if the background and border colors are POKEd into memory at line 10, you could use the following code to change the default colors:

```
1000 SYS 828,10,"POKE 53281,"+
     STR$(BG)+":POKE 53280,"
     +STR$(BD)
1010 OPEN 15,8,15,"S0:filename":
     CLOSE 15:SAVE"filename",8
```

where BG and BD are the user's choice of background and border colors, respectively. You could also save the character color or anything else you wanted.

What about saving the high scores for a game? Instead of saving the scores to a disk file, place them in DATA statements and use Rewrite to update them. You could store database information, as well. In fact, you could use Rewrite to store *any* type of information. Just resave the program when you've finished—as in the color example above—and your data will be ready every time you run your program.

See program listing on page 78. **G**

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Not To Be Confused With The Game Of The Same Name

THE 1581 TOOLKIT

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It blew people away at the "World Of Commodore Show" held in Pennsylvania in November 1988. It's power and scope astonish anyone who sees it work. And, if you have a 1581 drive, it is the single most important piece of software that you can own. It is The 1581 Toolkit-and it will transform your 1581 into something remarkable.

We know the market, and we know that if you've bought any other 1581 utility in the past, you've probably been disappointed. But while other companies rushed ill-conceived and poorly executed products to market to "cash in" on the new 1581 drive, we did things differently. Our programmers took the time to become experts on the 1581 before they even looked at a drawing board. So when they finished the Toolkit project a full year later, they had accomplished what no one else had - the creation of a tight, integrated package of essential utilities that make the 1581 more than the sum of its parts. Take a look at these Toolkit utilities and see why we're so excited about it:

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- Directory Editor
- File Track & Sector Tracer
- Fast File Copier
- Byte Pattern Search
- Ultrafast Formatter
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- Track & Sector Editor
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All 10 of these custom utilities use extremely fast read/write routines. Wherever appropriate, they allow full access to partitions. It's obvious we created The 1581 Toolkit to be the finest set of utilities available for the 1581 drive. But we didn't stop there. Order now, and we'll also send you the 1581 DOS Reference Guide FREE! With over 100 pages of concise, valuable information, you'll quickly find this book indispensable! Written by David Martin (INFO Magazine's Copy Corner reviewer), this manual represents a year's worth of research and investigation into the inner workings of the 1581 drive. We've also added extra utilities, including such handy items as a machine language monitor with DriveMon, the perfect companion for the 1581 DOS Reference Guide.

We've spent a lot of time working hard to make sure that nobody knows more about the 1581 than we do. Don't sell your 1581 short. Get the 1581 Toolkit today, and let us show you just what it's really capable of. We'll take your 1581 absolutely as far as it was designed to go. And then we'll take it farther.

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The 1581 Toolkit Works On The C-64 Or The C-128/C-128D In The 64 Mode

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THE 1750 CLONE

Thanks For The Memory

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You can't find them.

That's right. These RAM units are almost impossible to buy. We've always specialized in finding solutions to Commodore related problems - here's what we came up with.

First, we bought brand new Commodore 1764 RAM expansion units, the ones with only 256k of RAM onboard. Next, we had Chip Level Design engineer and produce a custom upgrade that takes a 1764 to a full 512k! That's the same half meg of RAM as a regular 1750! Finally, we tested each and every cartridge, and warranteed them to be free from defects.

Now there's nothing to stop you from taking your Commodore 64 or 128 to levels of power and sophistication that the original designers never even dreamed of! If you're using programs like GEOS from Berkeley; the Pocket Series from Digital Soutions; future versions of Maverick from Kracker Jax; Fleet System IV from Professional Software; or the potent PaperClip III from Batteries Included; if you're using ANY of these programs, you won't believe the difference that the extra memory makes!

IMPORTANT NOTES - READ CAREFULLY

*C-64/64c (but NOT C-128/128D) owners MUST buy a heavy-duty power supply to use these units. The power supply is NOT included - it is available from us seperately.

* If you ALREADY own a 1764 RAM cartridge, we can upgrade it for you. Your unit MUST be in perfect working order for us to upgrade it. The turnaround time on upgrades is approx. 2 weeks. It will NOT be necessary for you to purchase a new power supply - the one that came with your 1764 will still work fine.

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ATTENTION C-128 OWNERS

Solderless 64K Video RAM Upgrade

Now that Commodore has released the C-128D with 64K of video RAM, we should be seeing 128 programs address this fantastic new feature soon.

BASIC 8 already has the capability of using all 64K of video RAM. If you own the C-128 in stock condition, you own all 16K of video RAM that Commodore felt was necessary. Using Basic 8 format and the full 64K of video RAM provides you with the ability to scroll through video memory as well as enhanced color resolution.

Up until now, to upgrade the C-128 to 64K of video RAM you would have to first search out the components, then find a competent repair outlet to desolder and install the parts. **What a hassle!**

SOLUTION — We have developed a module that simply plugs in to the mother board of your C-128. **No splattered solder — No heat damage — No hassle.**

This package is available in two different forms. Model A has all parts necessary to complete your upgrade, and Model B is identical except that you supply the RAMs. Again, no soldering is necessary. If you have access to low cost RAMs, we suggest Model B.

Both models include easy to follow installation instructions, a test program to verify proper installation, and the plug in Video RAM Upgrade.

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machine language programming

Laws of Motion

Jim Butterfield

The movement of bodies which are influenced by forces is a complex area. Newton started the science of calculus in part to explain why the planets move as they do. The math gets difficult, especially when several bodies are in motion.

It all becomes easy if we recall the principle behind calculus: Examine something with sufficiently great magnification over sufficiently small intervals of time, and everything is simplified. Greatly magnified curves become straight lines; complex motions viewed over an instant become linear.

A Simulation

A fast computer is the ideal device to calculate these tiny motions over and over again. In the process, the math becomes simple. Let's try our hand at a simple object in motion: a brick dropping from the sky and bouncing a few times. We'll use a sprite to represent the brick and write the program for the Commodore 64.

At any instant, we can determine the motion of our brick, in both the X and Y directions, from two simple formulas:

```
New Velocity = Old Velocity +
  Acceleration × Time
New Position = Old Position +
  Velocity × Time
```

We'll repeat the above calculations at regular intervals and choose our scale for realistic motion. In the X direction (across the screen), we'll assume a constant velocity and an acceleration of 0. In the Y direction, we'll use a value of 5 for acceleration—that's gravity. If we had a rocket ship that could exert thrust, the acceleration would be the combination of gravity and thrust.

BASIC draws the sprite for us (a simple brick shape) and initially positions it (sprite 0) just off the upper left corner of the screen. The X position is stored directly in the horizontal-position register at $D000 (decimal 53248); the Y position is set into RAM at locations $2080 and $2081 (8320 and 8321, respectively). The Y velocity, at $2082 and $2083 (8322 and 8323, respectively), is initialized to 0. At this point, our machine language routine takes control of the sprite.

Look Out Below

We want to update the position of the sprite at regular intervals. The ticking of the jiffy clock (TI), which happens 60 times a second, is ideal as a triggering event. (We wouldn't be able to see events on the screen that happened faster than that, anyway.) The jiffy clock's low byte is at address $A2 (decimal 162); our program must wait for the contents of this location to change. Assume that register X contains the previous contents of $A2:

```
2000 CPX $A2   (is TI the same?)
2002 BNE $200A (branch on tick)
```

When the contents of $A2 no longer match the X register, we skip ahead and update the position. Meanwhile, as we wait, we'll check the RUN/STOP key so that the program can be stopped manually as desired:

```
2004 JSR  $FFE1 (check for RUN/STOP)
2007 BNE  $2000
2009 RTS  (exit with RUN/STOP)
```

If the clock has ticked, we calculate our X motion. This is simple: Move one pixel for every two clock ticks. How do we detect every other tick? Easy: Test the lowest bit of the X register (which contains an old TI timer value). If it's even, skip ahead; if it's odd, move the sprite.

```
200A TXA  (TI has changed)
200B LSR
200C BCC  $2011
200E INC  $D000 (increase on odd tick)
```

Now we log the new time into X and proceed with our formula. Add the vertical acceleration (5) into the Y velocity and then update the Y position. Remember that we're dealing with two-byte numbers.

```
2011 LDX $A2   (update X register)
2013 CLC
2014 LDA $2083 (add Y velocity . . .)
2017 ADC #$05  (. . . to acceleration)
2019 STA $2083 (. . . and store in . . .)
201C LDA $2082 (. . . Y velocity)
201F ADC #$00
2021 STA $2082
2024 CLC
2025 LDA $2083 (update Y position)
2028 ADC $2081
202B STA $2081
202E LDA $2082
2031 ADC $2080
2034 STA $2080
```

This last value is the *high* byte of the sprite Y position; we put it into the register at $D001 (decimal 53249). A new thought: We don't want our sprite to go completely off the bottom of the screen. So we test this value to see if it has reached a limit—say, $F0 (decimal 240).

```
2037 STA $D001 (store Y position)
203A CMP #$F0  (greater than 240?)
203C BCC $2000 (if not, continue)
```

What should we do when the sprite passes our limit? We'll make the brick bounce.

Follow the Bouncing Brick

How do you simulate a bouncing object? You reverse the velocity: Going down changes to going up. How do you make a value negative? You subtract it from 0. Thus, 0 minus 6 gives −6, and in two-byte hexadecimal, 0000 minus 0001 gives FFFF—the hex equivalent of −1. Value $FFFF acts like a negative number, and, for all practical purposes here, *is* a negative number.

There's another consideration with our bouncing brick. We want the object to lose energy. Therefore, we halve the velocity before we make it negative. If the brick were falling at a rate of 6, for example, it

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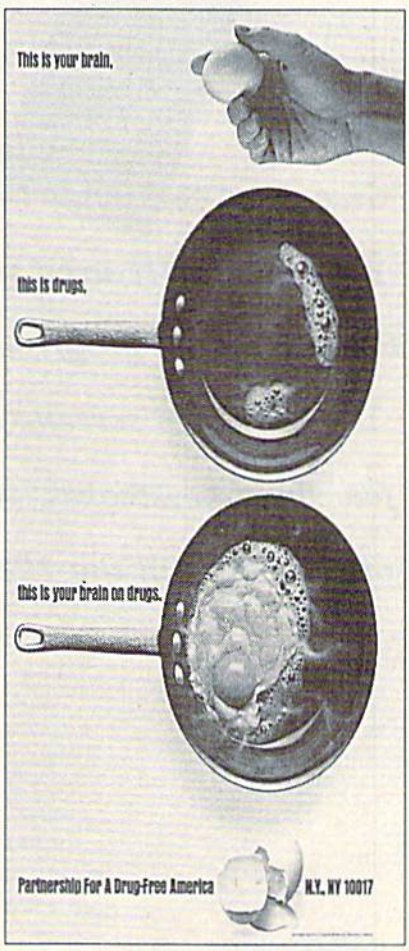
would go back up on the bounce with a speed of −3. To halve the rate, we divide by 2 by using a right shift (LSR and ROR). The remaining code is

```
203E LDA $2082 (halve Y velocity . . .)
2041 BMI $2000 (. . . only if positive)
2043 LSR $2082 (now halve Y rate)
2046 ROL $2083
2049 LDA $2082 (is Y velocity . . .)
204C BNE $2055 (. . . less than 5?)
204E LDA $2083
2051 CMP #$05
2053 BCC $2068 (if so, exit)
2055 SEC       (otherwise, make . . .)
2056 LDA #$00  (. . . Y rate negative)
2058 SBC $2083
205B STA $2083
205E LDA #$00
2060 SBC $2082
2063 STA $2082
2066 BCC $2007 (and continue)
2068 RTS
```

To try the program, type in and run the BASIC loader below.

Bouncing Brick

```
GK 10 DATA 228,162,208,6,32,22
      5,255,208
CQ 20 DATA 247,96,138,74,144,3
      ,238,0
KA 30 DATA 208,166,162,24,173,
      131,32,105
JB 40 DATA 5,141,131,32,173,13
      0,32,105
AF 50 DATA 0,141,130,32,24,173
      ,131,32
JM 60 DATA 109,129,32,141,129,
      32,173,130
HK 70 DATA 32,109,128,32,141,1
      28,32,141
PJ 80 DATA 1,208,201,240,144,1
      94,173,130
KH 90 DATA 32,48,189,78,130,32
      ,46,131
RA 100 DATA 32,173,130,32,208,
       7,173,131
FE 110 DATA 32,201,5,144,19,56
       ,169,0
MH 120 DATA 237,131,32,141,131
       ,32,169,0
XB 130 DATA 237,130,32,141,130
       ,32,144,159,96
CC 140 FORJ=8192TO8296:READA:X
       =X+A:POKEJ,A:NEXT:IFX<>
       11758THENSTOP
AX 150 FORJ=704TO766:POKEJ,0:N
       EXT:FORJ=704TO710STEP3:
       POKEJ,255:NEXT:REM SPRI
       TE
KD 170 POKE2040,11:REM POINT T
       O SPRITE DATA
DX 180 POKE53248,0:POKE53249,6
       0:REM LOCATE SPRITE 0 A
       T (0,60)
DQ 190 POKE53287,2:POKE53269,1
       :REM COLOR SPRITE 0 AND
        TURN IT ON
JG 210 POKE8320,60:POKE8321,0:
       REM INITIALIZE Y POSITI
       ON
RH 220 POKE8322,0:POKE8323,0:R
       EM INITIALIZE Y VELOCIT
       Y
AA 230 SYS 8192
JX 240 POKE53269,0:REM TURN OF
       F SPRITE 0
```

MACROBASIC

Terry Bryner

Give your computer the power to add frequently used subroutines to your BASIC programs or recall custom help screens with just a few short keystrokes. Versions for both the 64 and the 128 included.

"MacroBASIC" is a powerful utility that adds macro capabilities to your 64 or 128. Macros can consist of executable BASIC commands, or just text strings for help screens, notes to yourself, and so on. MacroBASIC even allows you to store frequently used BASIC subroutines in a macro that can be merged with a program in memory at the line of your choosing.

MacroBASIC does even more. It adds a combination scratch pad and BASIC subprogram library capability to your 64 or 128. It keeps important information at your fingertips, making your computer friendlier and more useful than ever before.

Getting Started

MacroBASIC is written entirely in machine language, so enter the version for your computer using "MLX," the machine language entry program found elsewhere in this issue. When MLX prompts you, respond with the values given below.

MacroBASIC 64

Starting address: $0801
Ending address: $1918

MacroBASIC 128

Starting address: $1C01
Ending address: $2E50

Be sure to save a copy of MacroBASIC to disk before you leave MLX. Although MacroBASIC is written in machine language, you can load, run, and save it as if it were a BASIC program.

MacroBASIC supports two types of macros—information macros and executable macros. Information macros display information on the screen and are listed using the up-arrow command. To list an information macro, type ↑*name*, where *name* is the name of the macro to be listed. Executable macros perform actions and are invoked using the left-arrow command. Simply type ←*name* to execute the macro *name*.

Both versions of MacroBASIC add several commands to BASIC, along with four predefined macros. These commands work in direct mode only; they do not work in BASIC programs. Commands must begin in the first column of the screen. MacroBASIC commands can be viewed at any time by typing ↑HELP (an information macro). Type £ to view a list of all the macros in memory. Other predefined macros include BITS, WAIT, and COLOR (the 64 version also includes a macro called DEVICE9, which is explained below). These are all executable macros.

The COLOR macro changes the screen colors: Just type ←COLOR to see the screen change to a black border, black background, and blue text. The BITS and WAIT macros are for BASIC programmers. Since the setting or clearing of a single bit is a common operation, it's a perfect candidate for an executable macro. Executing the BITS macro (by typing ←BITS) adds a section of code to the program in memory to generate OR and AND masks and the functions necessary to set or clear individual bits. Type ←BITS and then type LIST to see the new section of code.

Waiting for a keypress is another common operation. The WAIT macro adds to the program in memory a section of code that causes it to wait for a keypress. By default, WAIT and BITS insert code beginning at lines 5 and 100, respectively. To avoid overwriting existing code, MacroBASIC allows you to specify where executable macros insert code. This is done by appending the string £*line number* to the execute command, where *line number* tells where you want the code inserted. For example, the command ←BITS£9000 inserts the code at line 9000.

Creating Macros

Besides offering predefined macros, MacroBASIC allows you to create custom macros of your own. You can design macros to move and display sprites, create sound effects, and so on. You can define as many as 50 macros, with up to 8K of text for help screens and notes.

To create a macro, type an equal sign followed by a macro name. The macro name must consist of the alphanumeric characters 1–8. The border will then flash once to indicate that a macro is being defined. Type in the macro one line at a time. Information macros are simply lines of text; executable macros are BASIC statements. Commands with line numbers in executable macros are appended to the program in memory; commands without line numbers in executable macros are executed immediately, exactly as if you have typed the commands on the keyboard. When you have finished defining the macro, type = to save it in memory. (Remember that for MacroBASIC to save the macro, the = must be in the first column.) To delete a macro, type =*name*, where *name* is the name of the macro you want to delete. MacroBASIC asks for confirmation before deleting the macro.

An alternate method of creating an executable macro is to list a program segment on the screen; simply enter =*name* and then use the cursor keys to move the cursor up the screen, pressing RETURN on each line. MacroBASIC uses the BASIC editor and saves the line only when the RETURN key is pressed. Lines can be edited before you press RETURN.

Subroutine macros that refer to themselves with a GOTO, GOSUB, or IF-THEN statement must be handled carefully. Because they may be inserted at any line within a program, MacroBASIC must adjust these jumps correctly. To do this, place a £ in front of the target line number. You can see this feature in operation by listing the WAIT macro (type ↑WAIT). Line 10 looks like this: 10 GETKY$:IFKY$="" THEN£10. The £ sign tells MacroBASIC to adjust the target line number when it is inserting the macro into a program. Now when you type ←WAIT£9000, the GOTO will be adjusted accordingly.

Macros can be saved in library files on disk for later use. Type **filename* to save the macros in memory to a disk library file (do not put quotation marks around the filename). To load a macro library file, type +*filename*, where *filename* is the name of the macro library file to be loaded. This command replaces all current macros with the macros defined in the library file. If you wish to retain the current macros, type π*filename*. This command searches through the library file, ignoring duplicate macros. MacroBASIC prompts you before it loads any library macros not already in memory.

You don't need to load MacroBASIC to use a library file. Each library file contains a copy of MacroBASIC. Simply load the library file like a BASIC program and then type RUN.

MacroBASIC Command Summary

£	displays a list of the macros in memory
↑*name*	displays the macro called *name*
←*name*	executes the macro called *name*
←*name*£200	inserts the macro *name* at line 200
=*name*	begins creating macro named *name* (also allows deletion of existing macro *name*)
=	ends creation of macro
**name*	saves macros to a library file on disk called *name*
+*name*	replaces macros in memory with those in the library file called *name*
π*name*	displays names of macros in the library file *name*, allowing addition to those in memory
$	displays disk directory
@	sends disk command
#	changes disk drive (128 only)

All commands must start in column 1.

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Disk Commands

MacroBASIC makes it easy to issue disk commands. MacroBASIC allows you to get a disk directory using the dollar-sign command; just put a disk in the drive and type $. An added benefit of this command is that it doesn't destroy the program in memory the way LOAD "$",8 does.

Other disk commands, such as NEW, COPY, RENAME, SCRATCH, INITIALIZE, and VALIDATE, are equally easy to use. Type MacroBASIC's at command (@) followed by the first letter of the disk command. For example, @N0:*name,ID* formats the disk in drive 8. *Name* should be a string of 16 characters or less, and *ID* is a 2-character string. The command @S0:*Filename* deletes the file *Filename* from the disk.

Normally, these commands refer to the default disk drive, drive 8. With the 64 version of MacroBASIC, executing the macro DEVICE9 makes drive 9 the default drive for MacroBASIC commands. After this macro is executed, all disk commands work on drive 9 (note that the $ command still works on drive 8). DEVICE9 is not defined for the 128 version. However, MacroBASIC 128 has a command, the pound command, that changes the default disk drive. Type # followed by the drive's number. To make drive 9 the default, for example, type #9.

Technical Notes

MacroBASIC 64 wedges itself into BASIC through the IMAIN vector at $0302. MacroBASIC 64 uses the free RAM from $C000 to $CFFF and the RAM under the Kernal ROM.

Macros work only in direct mode (not when a program is running). MacroBASIC disk commands assume drive 8 will be used, but this can be changed by executing the macro DEVICE9. The change is permanent, but you can build a DEVICE8 (or a macro for any other drive) by changing the value assigned to the variable A in the first line of the DEVICE9 macro.

MacroBASIC 128 also wedges itself into BASIC through the IMAIN vector at $0302. It uses the space from $1300 through $1B7A in bank 0 and the space from $03FD through $4000 in bank 1. (Because of this, you lose a small amount of variable storage space.) MacroBASIC 128 also uses the RS-232 buffer at $0C00–$0DFF when appending macros from a library file. As in the 64 version, MacroBASIC 128 disk commands assume drive 8 will be used when it first starts up. This can be changed with the # command.

MacroBASIC has several limitations. While macros can be composed of many lines, each line must be 40 characters or less in length. You can't use BASIC's CMD command in macros. The CMD command executes properly, but the rest of the macro is ignored.

MacroBASIC does not allow nested macros. You may create as many as 50 macros with up to 8K of text, but macros can't execute other macros. Finally, MacroBASIC is not disabled by RUN/STOP–RESTORE. Type SYS64738 to disable MacroBASIC 64; press the reset button to disable MacroBASIC 128.

See program listings on page 87. **G**

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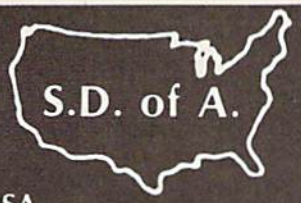

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horizons

The Commodore 128—A Dinosaur?

Rhett Anderson

Almost a year ago, the original Commodore 128 disappeared. Commodore 1571 disk drives and 1750 RAM expanders became scarce. After years of being one of the best-selling computers around, the 128 was abruptly pulled off the shelves. The 128D, a higher-priced version of the computer that sports a detachable keyboard and built-in drive, became the only 64-compatible computer around.

Now, if we believe a current rumor, the 128D has also gone the way of the dinosaur. This will likely come as a shock to many of our readers, especially when you consider that, according to our last readership survey, one-third of the respondents who planned on buying a new computer in the next year were planning on a 128.

Fortunately, the Commodore 64 is still in production, but pessimists ask how long even that computer (purported to sell a million a year) will stay in production.

What's Going On?

A few years ago, Commodore stopped production of the 64, hoping to kill off the computer to make room in the market for the 128 and the Amiga. The public (and dealer) reaction to the move prompted Commodore to think again. Recently, Commodore stated that it would sell Commodore 64s as long as people wanted them.

So why did Commodore discontinue the 128, if people evidently want them? Probably because the company gets little out of the machine. With its two microprocessors and its two video chips, the 128 is probably one of the more expensive home computers to produce. Some observers have speculated that a 128 costs more to manufacture than an Amiga 500 or a Commodore PC-compatible Colt. It's easy to see why Commodore might think of one of its own computers as a threat to its livelihood.

I think the Commodore 64 is safe for now. Commodore wants you to buy a 64 as your first home computer. When you're ready to move up, the company would like you to buy an Amiga. It doesn't want you to take the intermediate step to the 128. The Amiga is picking up steam, and Commodore would like you to move up directly.

For Commodore, it's a dangerous game. Unable to successfully market the Amiga to the consumer at large, Commodore has relied upon the extreme loyalty of its users. While the company wants to concentrate on its next generation of computers, it dares not move too fast lest the 64 owners feel betrayed.

The Smart Shopper

How will our readers be affected by the demise of the 128? First, expect to see a drought in new software releases for the 128. Of course, 128-specific software has never been plentiful, anyway. Those who own a 128 and already have all the software they need don't have much to worry about (but if you want a 1571 drive, you'd better buy one now).

Readers who have been planning on buying a 128 have a difficult decision to make. Should you stay with the 64 and forget the 128? Or should you go ahead and buy the 128 now? Or should you buy a different computer altogether? It depends. If you really want a 128, buy it now. Otherwise, I would advise you to stick with the less expensive 64. The best reason for buying a 128 is to have 80 columns of text for word processing, if that's something you need.

Current and future 128 owners will continue to benefit from Commodore 64 software and hardware, despite the inevitable falloff of 128-specific add-ons and programs.

And the 64?

With the recent disappearance of one Commodore 8-bit magazine, and with the drastic fall in the circulation of another, should Commodore 64 owners be worried? Not at all. The Commodore market still looks good from here (in fact, *Gazette*'s circulation in the past six months has shown a moderate climb). I fully expect that the 64 has at least two more years of being an important and vital computer. Even after the last 64 leaves the store shelves, the user's groups and magazines will keep the machine alive for a long, long time to come.

You might ask how long Commodore will continue to sell the 64. Your guess is as good as mine. The forces on the company first push it one way, then pull on it from the other. But if the price of the Amiga 500 breaks below $300, look out 64—Commodore will have a new introductory-level computer.

Wild Speculation

But wait—maybe Commodore has something up its sleeve. A new, more powerful Commodore 64. Something to perk up the low-end market. After all, the 64 has remained unchanged for over five years. More colors, perhaps? More memory? Better graphics and sound? Why continue to market the 128 if you have a super-64 in the wings?

I'd bet against it, but I'm willing to take the credit for predicting the future if Commodore comes out with a new and improved 8-bit. **G**

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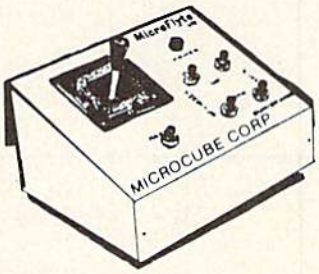

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d'iversions

Nintendo Revisited

Fred D'Ignazio

A couple of months ago I wrote a column subtitled "Is There Life After Nintendo?," in which I examined the origins of children's fascination with the Nintendo videogame system. The column came out sounding a little like an endorsement for Nintendo, so I wondered if any readers would rise to the challenge and defend their Commodore 64.

I was not disappointed. Last week I received a letter from Dennis Joslin of Ridge Manor, Florida. The letter is so eloquent that I thought I'd print it in the hope of stirring up some more debate between computer users and Nintendo videogamers. Here's the letter:

> I have a tune for you to hum. How about the theme song from the title screen of *Neuromancer?* Perfect digitized music. The song sung by Devo. Or why not hum some of the many examples of digitized sound for the Commodore 64? Or hum a tune that you made yourself from *Instant Music* by Electronic Arts, or a similar program? Are there any cartridges for the Nintendo system that have music that good, or are there any that allow you to make your own music? Can you do *anything* at all with sound on the Nintendo? No.
>
> Do you know any game for Nintendo with as much complexity as *Rocket Ranger,* or with the great digitized speech on *Rocket Ranger,* perfectly understandable, with a German accent that sounds real? And the mouth of the person talking moves with the word he is saying?
>
> Is it possible to make games as complex as *Flight Simulator II* for the Nintendo? No, because it would be impossible to control the aircraft with two pads.
>
> Can you make titles for your home VCR movies with the Nintendo? Now comes the biggie: Can you do *anything* productive on the Nintendo? I think you know the answer to that one.
>
> Well, since there is nothing you can do productive on the Nintendo, then why buy one? The games on Nintendos can be fun, but the graphics are nothing new. "Games can be done better on a 64 than on a Nintendo," says Epyx president David Morse. The reason people buy Nintendos is to be "cool." Usually, these people (mostly kids) think that the Nintendo is the best game machine available. The people who think that are crazy. As a game system, the Nintendo is good at some games, but have you compared it with Sega? Most people don't even consider a Sega because then they wouldn't be as popular. The Sega has much better graphics, a huge game list, and 64 colors instead of 52.
>
> That brings me to another point: You say that Nintendo graphics are colorful. They are not. The colors on Nintendo are flat and boring. The Commodore 64, with only 16 colors, has brighter colors than the Nintendo.
>
> You say that more than half of all homes with children have a Nintendo. I do not agree. For example, in my neighborhood, which is a typical neighborhood, I found out that only two of five houses have Nintendos. In school, I asked 21 people if they had a Nintendo or not. I found out that 1 had an IBM, 1 had a Sega, 7 had Commodores, and 5 had Nintendos. That's a long way from one-half.
>
> Thanks for reading this letter, and I hope it makes you think about what you said in your column. Also, keep up the good work (except for the last one).
>
> *Sincerely,*
> *Dennis Joslin*

The Nintendo invasion is here in a big way. Is its success based on merit or on marketing hype?

What Do You Think?

After I'd received Dennis's letter, I saw a report on television that said Nintendo had captured 87 percent of the American videogame market. I would certainly call that an invasion.

What do you folks out there think? Are you alarmed about Nintendo's success? Do you think it's based on Nintendo's merits (as I maintained) or on marketing hype (as Dennis believes)? What does the Nintendo phenomenon mean to all of us Commodore 64 owners? What kind of counterattack strategies do you recommend for Commodore's execs? What impact will Nintendo have on computer games in general?

I'd like to hear from you. Please write to me:

Fred D'Ignazio
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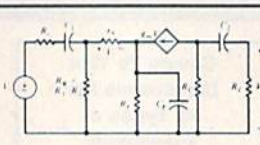

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MLX Machine Language Entry Program For Commodore 64 and 128

Ottis R. Cowper

"MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs. Included are versions for the Commodore 64 and 128.

Type in and save some copies of whichever version of MLX is appropriate for your computer (you'll want to use it to enter future ML programs from COMPUTE!'s GAZETTE). Program 1 is for the Commodore 64, and Program 2 is for the 128 (128 MLX can also be used to enter Commodore 64 ML programs for use in 64 mode). When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing. (Commodore 128 users *can* enter the data from an MLX listing using the built-in monitor if the rightmost column of data is omitted, but we recommend against it. It's much easier to let MLX do the proofreading and error checking for you.)

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

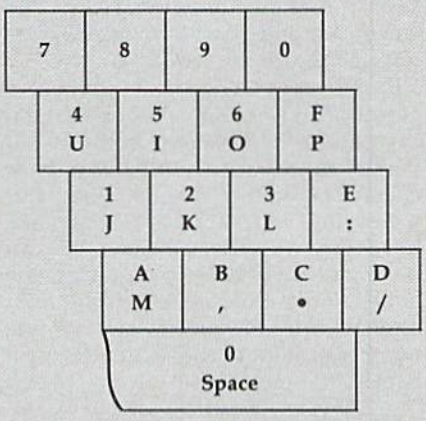
Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

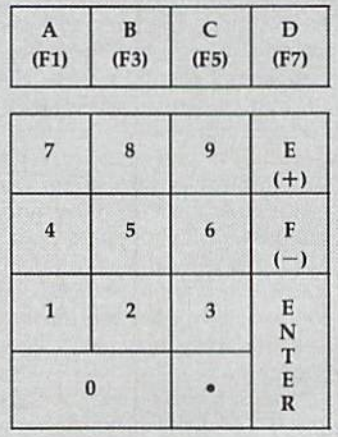
Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and − keys on the numeric keypad so that you can enter data one-handed. (The 64 version incorporates the keypad modification from the March 1986 "Bug-Swatter" column, lines 485–487.) In either case, the keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figures above show the keypad configurations for each version.

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

64 MLX Keypad



128 MLX Keypad



Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line

number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save (save only for the 128 version). Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands (128 MLX makes use of BLOAD). Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750 in 64 MLX), so this should *not* be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name. The 128 version makes up for this by giving you the option of scratching the existing file if you want to reuse a filename.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The 128 version also has a CATALOG DISK option so you can view the contents of the disk directory before saving or loading.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP–RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk (DLOAD *"filename"* on the 128) or LOAD *"filename"* for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64 or 1C01 for the 128. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk (BLOAD *"filename"* on the 128) or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

Program 1: MLX for Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
      I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56
      ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$=" ":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}{8 @}
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
```

```
      RESS[4];:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[4];:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA
      R WORKSPACE [Y/N][4];A
      $:IF LEFT$(A$,1)<>"Y"TH
      EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[4]":
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
       FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$("EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[4]ARE YOU SURE
       [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
      [4]";:GOSUB300:IF IN$<>
      N$ THEN GOSUB1030:IF F
      {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
      {SPACE}":GOSUB400:IF IN
      $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
       THEN PRINT IN$:PRINT"
      {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$
      =S$:FOR J=1 TO 2:IF F T
      HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<
      24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A
      $>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-
      3*(A$=".")-4*(A$="/")-5
      *(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
      ")-9*(A$="U")-10*(A$="I
      ")-11*(A$="O")-12*(A$="
      P")
CM 487 A=A-13*(A$=S$):IF A THE
      N A$=MID$("ABCD123E456F
      0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
      =1)OR F)THEN PRINT B$;:
      J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
      NT B$:J=2:NEXT:I=24:NEX
      T:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF TH
      ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
      ((I=0)AND(J=1))THEN GOS
      UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
      :J=2-J:IF J THEN PRINT
      {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
      {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}
      {5 RIGHT}";:INPUT#3,IN$
      :IF IN$=N$ THEN CLOSE3:
      GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
      MID$(IN$,I):GOSUB320:IF
       I<25 THEN GOSUB380:A(I
      /3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
      B1060:PRINT"{BLK}{RVS}
      {SPACE}ERROR: REENTER L
      INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
      R I=0 TO 7:POKE B+I,A(I
      ):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
      LOSE3:PRINT"{DOWN}{BLU}
      ** END OF ENTRY **{BLK}
      {2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}
      {SPACE}DISPLAY DATA ":G
      OSUB400:IF IN$=N$ THEN2
      20
RJ 620 PRINT"{DOWN}{BLU}PRESS:
       {RVS}SPACE{OFF} TO PAU
      SE, {RVS}RETURN{OFF} TO
       BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
      I=BTO B+7:A=PEEK(I):GOS
      UB350:GOSUB380:PRINT S$
      ;
CC 640 NEXT:PRINT"{RVS}";:A=CK
      :GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
      ENPRINT"{DOWN}{BLU}** E
      ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
      SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
      UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD
      {SPACE}DATA ":OP=1:GOTO
      710
PC 700 PRINT"{DOWN}{RVS} SAVE
      {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILE
      NAME[4]";IN$:IF IN$=N$
      {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}
      {RVS}T{OFF}APE OR {RVS}
      D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
      INT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
      ,15,"I0:":B=EA-SA:IN$="
      0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
      OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
      H*256):PRINT#1,CHR$(AL)
      ;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
      R$(PEEK(BS+I));:IF ST T
      HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
      O940
GS 800 GOSUB1060:PRINT"{DOWN}
      {BLK}ERROR DURING SAVE:
      [4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
      OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
      $)+256*ASC(B$+Z$):IF AD
      <>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
      OKE BS+I,ASC(A$+Z$):IF(
      I<>B)AND ST THEN F=2:AD
      =I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
      >0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
       CLOSE1:CLOSE15:GOSUB10
      60:PRINT"{RVS}ERROR: "A
      $
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
      187,PEEK(FA+3):POKE188,
      PEEK(FA+4):IFOP=0THEN92
      0
HJ 890 SYS 63466:IF(PEEK(783)A
      ND1)THEN GOSUB1060:PRIN
      T"{DOWN}{RVS} FILE NOT
      {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
      30):IF AD<>SA THEN F=1:
      GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
      2)-1:F=F-2*(A<EA)-3*(A>
      EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
      OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
      UB1010:ON OP GOTO950:SY
      S 63591
AE 940 GOSUB1080:PRINT"{BLU}**
       SAVE COMPLETED **":GOT
      O220
XP 950 POKE147,0:SYS 63562:IF
      {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}**
       LOAD COMPLETED **":GOT
      O220
DP 970 GOSUB1060:PRINT"{BLK}
      {RVS}ERROR DURING LOAD:
      {DOWN}[4]":ON F GOSUB98
      0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
      G ADDRESS (";:GOSUB360:
      PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
      AD=SA+AD:GOSUB360:PRINT
       D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
      ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
      *256):POKE193,AL:POKE1
      94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
      *256):POKE174,AL:POKE1
      75,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN
      1050
HA 1040 IF(AD>511 AND AD<40960
```

```
        )OR(AD>49151 AND AD<53
        248)THEN GOSUB1080:F=0
        :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
        {SPACE}INVALID ADDRESS
        {DOWN}{BLK}":F=1:RETU
        RN
AR 1060 POKE SD+5,31:POKE SD+6
        ,208:POKE SD,240:POKE
        {SPACE}SD+1,4:POKE SD+
        4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
        TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
        240:POKE SD,0:POKE SD+
        1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
        KE SD+4,0:POKE SD,0:PO
        KE SD+1,0:RETURN
```

Program 2: MLX for Commodore 128

```
AE 100 TRAP 960:POKE 4627,128:
       DIM NL$,A(7)
XP 110 Z2=2:Z4=254:Z5=255:Z6=2
       56:Z7=127:BS=256*PEEK(4
       627):EA=65280
FB 120 BE$=CHR$(7):RT$=CHR$(13
       ):DL$=CHR$(20):SP$=CHR$
       (32):LF$=CHR$(157)
KE 130 DEF FNHB(A)=INT(A/256):
       DEF FNLB(A)=A-FNHB(A)*2
       56:DEF FNAD(A)=PEEK(A)+
       256*PEEK(A+1)
JB 140 KEY 1,"A":KEY 3,"B":KEY
        5,"C":KEY 7,"D":VOL 15
       :IF RGR(0)=5 THEN FAST
FJ 150 PRINT"{CLR}"CHR$(142);C
       HR$(8):COLOR 0,15:COLOR
        4,15:COLOR 6,15
GQ 160 PRINT TAB(12)"{RED}
       {RVS}{2 SPACES}{9 @}
       {2 SPACES}"RT$;TAB(12)"
       {RVS}{2 SPACES}{OFF}
       {BLU} 128 MLX {RED}
       {RVS}{2 SPACES}"RT$;TAB
       (12)"{RVS}{13 SPACES}
       {BLU}"
FE 170 PRINT"{2 DOWN}
       {3 SPACES}COMPUTE!'S MA
       CHINE LANGUAGE EDITOR
       {2 DOWN}"
DK 180 PRINT"{BLK}STARTING ADD
       RESS{4}";:GOSUB 260:IF
       {SPACE}AD THEN SA=AD:EL
       SE 180
FH 190 PRINT"{BLK}{2 SPACES}EN
       DING ADDRESS{4}";:GOSUB
        260:IF AD THEN EA=AD:E
       LSE 190
MF 200 PRINT"{DOWN}{BLK}CLEAR
       {SPACE}WORKSPACE [Y/N]?
       {4}":GETKEY A$:IF A$<>"
       Y" THEN 220
QH 210 PRINT"{DOWN}{BLU}WORKIN
       G...";:BANK 0:FOR A=BS
       {SPACE}TO BS+(EA-SA)+7:
       POKE A,0:NEXT A:PRINT"D
       ONE"
DC 220 PRINT TAB(10)"{DOWN}
       {BLK}{RVS} MLX COMMAND
       {SPACE}MENU {4}{DOWN}":
       PRINT TAB(13)"{RVS}E
       {OFF}NTER DATA"RT$;TAB(
       13)"{RVS}D{OFF}ISPLAY D
       ATA"RT$;TAB(13)"{RVS}L
       {OFF}OAD FILE"
HB 230 PRINT TAB(13)"{RVS}S
       {OFF}AVE FILE"RT$;TAB(1
       3)"{RVS}C{OFF}ATALOG DI
       SK"RT$;TAB(13)"{RVS}Q
       {OFF}UIT{DOWN}{BLK}"
AP 240 GETKEY A$:A=INSTR("EDLS
       CQ",A$):ON A GOTO 340,5
       50,640,650,930,940:GOSU
       B 950:GOTO 240
SX 250 PRINT"STARTING AT";:GOS
       UB 260:IF(AD<>0)OR(A$=N
       L$)THEN RETURN:ELSE 250
BG 260 A$=NL$:INPUT A$:IF LEN(
       A$)=4 THEN AD=DEC(A$)
PP 270 IF AD=0 THEN BEGIN:IF A
       $<>NL$ THEN 300:ELSE RE
       TURN:BEND
MA 280 IF AD<SA OR AD>EA THEN
       {SPACE}300
PM 290 IF AD>511 AND AD<65280
       {SPACE}THEN PRINT BE$;:
       RETURN
SQ 300 GOSUB 950:PRINT"{RVS} I
       NVALID ADDRESS {DOWN}
       {BLK}":AD=0:RETURN
RD 310 CK=FNHB(AD):CK=AD-Z4*CK
       +Z5*(CK>Z7):GOTO 330
DD 320 CK=CK*Z2+Z5*(CK>Z7)+A
AH 330 CK=CK+Z5*(CK>Z5):RETURN
QD 340 PRINT BE$;"{RVS} ENTER
       {SPACE}DATA ":GOSUB 250
       :IF A$=NL$ THEN 220
JA 350 BANK 0:PRINT:F=0:OPEN 3
       ,3
BR 360 GOSUB 310:PRINT HEX$(AD
       )+":";:IF F THEN PRINT
       {SPACE}L$:PRINT"{UP}
       {5 RIGHT}";
QA 370 FOR I=0 TO 24 STEP 3:B$
       =SP$:FOR J=1 TO 2:IF F
       {SPACE}THEN B$=MID$(L$,
       I+J,1)
PS 380 PRINT"{RVS}"B$+LF$;:IF
       {SPACE}I<24 THEN PRINT"
       {OFF}";
RC 390 GETKEY A$:IF (A$>"/" AN
       D A$<":") OR(A$>"@" AND
        A$<"G") THEN 470
AC 400 IF A$="+" THEN A$="E":G
       OTO 470
QB 410 IF A$="-" THEN A$="F":G
       OTO 470
FB 420 IF A$=RT$ AND ((I=0) AN
       D (J=1) OR F) THEN PRIN
       T B$;:J=2:NEXT:I=24:GOT
       O 480
RD 430 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO 360
XB 440 IF (A$="{RIGHT}") AND F
        THEN PRINT B$+LF$;:GOT
       O 470
JP 450 IF A$<>LF$ AND A$<>DL$
       {SPACE}OR ((I=0) AND (J
       =1)) THEN GOSUB 950:GOT
       O 390
PS 460 A$=LF$+SP$+LF$:PRINT B$
       +LF$;:J=2-J:IF J THEN P
       RINT LF$;:I=I-3
GB 470 PRINT A$;:NEXT J:PRINT
       {SPACE}SP$;
HA 480 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:L$="
       {27 SPACES}"
DP 490 FOR I=1 TO 25 STEP 3:GE
       T#3,A$,B$:IF A$=SP$ THE
       N I=25:NEXT:CLOSE 3:GOT
       O 220
BA 500 A$=A$+B$:A=DEC(A$):MID$
       (L$,I,2)=A$:IF I<25 THE
       N GOSUB 320:A(I/3)=A:GE
       T#3,A$
AR 510 NEXT I:IF A<>CK THEN GO
       SUB 950:PRINT:PRINT"
       {RVS} ERROR: REENTER LI
       NE ":F=1:GOTO 360
DX 520 PRINT BE$:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT I
XB 530 F=0:AD=AD+8:IF AD<=EA T
       HEN 360
CA 540 CLOSE 3:PRINT"{DOWN}
       {BLU}** END OF ENTRY **
       {BLK}{2 DOWN}":GOTO 650
MC 550 PRINT BE$;"{CLR}{DOWN}
       {RVS} DISPLAY DATA ":GO
       SUB 250:IF A$=NL$ THEN
       {SPACE}220
JF 560 BANK 0:PRINT"{DOWN}
       {BLU}PRESS: {RVS}SPACE
       {OFF} TO PAUSE, {RVS}RE
       TURN{OFF} TO BREAK{4}
       {DOWN}"
XA 570 PRINT HEX$(AD)+":";:GOS
       UB 310:B=BS+AD-SA
DJ 580 FOR I=B TO B+7:A=PEEK(I
       ):PRINT RIGHT$(HEX$(A),
       2);SP$;:GOSUB 320:NEXT
       {SPACE}I
XB 590 PRINT"{RVS}";RIGHT$(HEX
       $(CK),2)
GR 600 F=1:AD=AD+8:IF AD>EA TH
       EN PRINT"{BLU}** END OF
        DATA **":GOTO 220
EB 610 GET A$:IF A$=RT$ THEN P
       RINT BE$:GOTO 220
QK 620 IF A$=SP$ THEN F=F+1:PR
       INT BE$;
XS 630 ON F GOTO 570,610,570
RF 640 PRINT BE$"{DOWN}{RVS} L
       OAD DATA ":OP=1:GOTO 66
       0
BP 650 PRINT BE$"{DOWN}{RVS} S
       AVE FILE ":OP=0
DM 660 F=0:F$=NL$:INPUT"FILENA
       ME{4}";F$:IF F$=NL$ THE
       N 220
PF 665 IF LEN(F$)>14 THEN 660
RF 670 PRINT"{DOWN}{BLK}{RVS}T
       {OFF}APE OR {RVS}D{OFF}
       ISK: {4}";
SQ 680 GETKEY A$:IF A$="T" THE
       N 850:ELSE IF A$<>"D" T
       HEN 680
SP 690 PRINT"DISK{DOWN}":IF OP
        THEN 760
EH 700 DOPEN#1,(F$+",P"),W:IF
       {SPACE}DS THEN A$=D$:GO
       TO 740
JH 710 BANK 0:POKE BS-2,FNLB(S
       A):POKE BS-1,FNHB(SA):P
       RINT"SAVING ";F$:PRINT
MC 720 FOR A=BS-2 TO BS+EA-SA:
       PRINT#1,CHR$(PEEK(A));:
       IF ST THEN A$="DISK WRI
       TE ERROR":GOTO 750
GC 730 NEXT A:CLOSE 1:PRINT"
       {BLU}** SAVE COMPLETED
       {SPACE}WITHOUT ERRORS *
       *":GOTO 220
RA 740 IF DS=63 THEN BEGIN:CLO
       SE 1:INPUT"{BLK}REPLACE
        EXISTING FILE [Y/N]{4}
       ";A$:IF A$="Y" THEN SCR
       ATCH(F$):PRINT:GOTO 700
       :ELSE PRINT"{BLK}":GOTO
        660:BEND
GA 750 CLOSE 1:GOSUB 950:PRINT
       "{BLK}{RVS} ERROR DURIN
       G SAVE: {4}":PRINT A$:G
       OTO 220
FD 760 DOPEN#1,(F$+",P"):IF DS
        THEN A$=DS$:F=4:CLOSE
       {SPACE}1:GOTO 790
```

```
PX 770 GET#1,A$,B$:CLOSE 1:AD=
       ASC(A$)+256*ASC(B$):IF
       {SPACE}AD<>SA THEN F=1:
       GOTO 790
KB 780 PRINT"LOADING ";F$:PRIN
       T:BLOAD(F$),B0,P(BS):AD
       =SA+FNAD(174)-BS-1:F=-2
       *(AD<EA)-3*(AD>EA)
RQ 790 IF F THEN 800:ELSE PRIN
       T"{BLU}** LOAD COMPLETE
       D WITHOUT ERRORS **":GO
       TO 220
ER 800 GOSUB 950:PRINT"{BLK}
       {RVS} ERROR DURING LOAD
       : {4}":ON F GOSUB 810,8
       20,830,840:GOTO220
QJ 810 PRINT"INCORRECT STARTIN
       G ADDRESS (";HEX$(AD);"
       )":RETURN
DP 820 PRINT"LOAD ENDED AT ";H
       EX$(AD):RETURN
EB 830 PRINT"TRUNCATED AT ENDI
       NG ADDRESS ("HEX$(EA)")
       ":RETURN
FP 840 PRINT"DISK ERROR ";A$:R
       ETURN
KS 850 PRINT"TAPE":AD=POINTER(
       F$):BANK 1:A=PEEK(AD):A
       L=PEEK(AD+1):AH=PEEK(AD
       +2)
XX 860 BANK 15:SYS DEC("FF68")
       ,0,1:SYS DEC("FFBA"),1,
       1,0:SYS DEC("FFBD"),A,A
       L,AH:SYS DEC("FF90"),12
       8:IF OP THEN 890
FG 870 PRINT:A=SA:B=EA+1:GOSUB
        920:SYS DEC("E919"),3:
       PRINT"SAVING ";F$
AB 880 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("EA18"):
       PRINT"{DOWN}{BLU}** TAP
       E SAVE COMPLETED **":GO
       TO 220
CP 890 SYS DEC("E99A"):PRINT:I
       F PEEK(2816)=5 THEN GOS
       UB 950:PRINT"{DOWN}
       {BLK}{RVS} FILE NOT FOU
       ND ":GOTO 220
GQ 900 PRINT"LOADING ...{DOWN}
       ":AD=FNAD(2817):IF AD<>
       SA THEN F=1:GOTO 800:EL
       SE AD=FNAD(2819)-1:F=-2
       *(AD<EA)-3*(AD>EA)
JD 910 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("E9FB"):
       IF ST>0 THEN 800:ELSE 7
       90
XB 920 POKE193,FNLB(A):POKE194
       ,FNHB(A):POKE 174,FNLB(
       B):POKE 175,FNHB(B):RET
       URN
CP 930 CATALOG:PRINT"{DOWN}
       {BLU}** PRESS ANY KEY F
       OR MENU **":GETKEY A$:G
       OTO 220
MM 940 PRINT BE$"{RVS} QUIT
       {4}";RT$;"ARE YOU SURE
       {SPACE}[Y/N]?":GETKEY A
       $:IF A$<>"Y" THEN 220:E
       LSE PRINT"{CLR}":BANK 1
       5:END
JE 950 SOUND 1,500,10:RETURN
AF 960 IF ER=14 AND EL=260 THE
       N RESUME 300
MK 970 IF ER=14 AND EL=500 THE
       N RESUME NEXT
KJ 980 IF ER=4 AND EL=780 THEN
        F=4:A$=DS$:RESUME 800
DQ 990 IF ER=30 THEN RESUME:EL
       SE PRINT ERR$(ER);" ERR
       OR IN LINE";EL
```

G

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The Automatic Proofreader

Philip I. Nelson

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, and 16 and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, **10 PRINT"THIS IS BASIC"** will generate a different checksum than **10 PRINT"THIS ISBA SIC"**.

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, *do not perform any GRAPHIC commands while the Proofreader is active.* When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you *run* any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP– RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, and 65526 for the Plus/4 and 16). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you're using a 64 and activate the Proofreader after installing the other utility.* For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
   ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

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BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Power BASIC:
128 Monitor Enhancer

Article on page 50.

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
RH 20 BANK15:TC=111591
KP 30 PRINT"{CLR}"TAB(9)"{RVS}
      {2 SPACES}128 ML ENHANCE
      R{2 SPACES}"
QB 40 PRINTTAB(12)"COPYRIGHT 1
      989":PRINTTAB(6)"COMPUTE
      ! PUBLICATIONS, INC."
PA 50 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED"
MR 60 S$="$1400":REM RELOCATAB
      LE STARTING ADDRESS
AF 70 PRINT:PRINTTAB(18);S$:IN
      PUT"{UP}STARTING ADDRESS
      ";S$
RP 80 S=VAL(S$):IFS=0THENS=VAL
      (STR$(DEC(MID$(S$,2))))
HP 90 PRINT:PRINT"STORING DATA
      ..."
ER 100 READY$:DO:POKES+A,DEC(Y
      $):C=C+DEC(Y$):A=A+1
HD 110 READY$:LOOP UNTIL Y$="E
      OD"
QP 120 PRINT:PRINT:IF C-TC THE
      N BEGIN
JC 130 PRINTCHR$(18)"=>RECHECK
       DATA STATEMENTS<="
PB 140 STOP:BEND
GH 150 REM HANDLE RELOCATION O
      F ML CODE
ME 160 IF S<>5120 THEN BEGIN:R
      EM RELOCATION REQUESTED
RE 170 PRINT:PRINT"DATA OK. AD
      JUSTING ML FOR NEW STAR
      TING{2 SPACES}ADDRESS."
QD 180 PRINT
BF 190 DEF FNO(D)=(PEEK(D)=320
      RPEEK(D)=760R(PEEK(D)>1
      39ANDPEEK(D)<143)ORPEEK
      (D)=440RPEEK(D)=1730RPE
      EK(D)=1740RPEEK(D)=2370
      RPEEK(D)=185)
GM 200 DEF FNA(D)=(PEEK(D+2)>1
      9ANDPEEK(D+2)<24)
RK 210 DEF FNH(D)=INT(D/256):D
      EF FNL(D)=D-FNH(D)*256:
      POKES+1,FNL(S+11):POKES
      +6,FNH(S+11)
PQ 220 POKES+69,FNL(S+102):POK
      ES+71,FNH(S+102):POKES+
      746,FNL(S+952):POKES+74
      8,FNH(S+952):POKES+770,
      FNL(S+954):POKES+772,FN
      H(S+954)
XR 230 FORT=STOS+A:IF FN O(T)T
      HENIF FN A(T)THENPRINT"
      . ";:TB=(PEEK(T+1)+PEEK
      (T+2)*256)-5120:POKE(T+
      1),FNL(S+TB):POKE(T+2),
      FNH(S+TB):T=T+2
KB 240 NEXT:BEND:PRINT
BS 250 POKES+78,PEEK(828):POKE
      S+80,PEEK(829)
EX 260 PRINT"STORAGE (HEX):";H
      EX$(S)"-";HEX$(S+A):PRI
      NT:PRINT
GF 270 SYS(S)
ER 280 PRINT CHR$(18)"128 ML E
      NHANCER ENABLED."
HJ 290 REM ML CODE IN HEX FORM
      AT
BD 300 DATA A9,0B,8D,2E,03,A9,
      14,8D,2F,03
EX 310 DATA 60,C9,58,D0,08,20,
      4D,14,A9,58
FF 320 DATA 4C,06,B0,C9,42,D0,
      06,20,44,14
GR 330 DATA 4C,8B,B0,C9,5C,D0,
      12,AD,30,D0
RS 340 DATA 29,01,D0,05,20,B3,
      77,D0,03,20
AP 350 DATA C4,77,4C,8B,B0,C9,
      21,D0,06,20
JB 360 DATA 83,16,4C,8B,B0,4C,
      B2,B0,A9,66
RD 370 DATA A2,14,EC,3D,03,D0,
      04,A9,AD,A2
XA 380 DATA C6,78,AC,3C,03,8C,
      73,14,AC,3D
SJ 390 DATA 03,8C,74,14,8D,3C,
      03,8E,3D,03
PF 400 DATA 58,60,78,48,C9,11,
      F0,0F,C9,91
XB 410 DATA F0,0B,68,58,4C,AD,
      C6,20,CE,15
FF 420 DATA 68,D0,F6,8D,C0,17,
      A5,E4,2C,C0
BM 430 DATA 17,10,02,A5,E5,C5,
      EB,D0,E5,A5
XS 440 DATA EC,C5,E6,D0,DF,24,
      D7,30,03,20
MQ 450 DATA 03,C7,20,AD,15,2C,
      C0,17,10,03
DJ 460 DATA 4C,27,15,20,E4,FF,
      C9,20,D0,10
QQ 470 DATA A5,EB,C5,E5,F0,C5,
      20,7D,FF,91
BR 480 DATA 1B,4A,00,4C,A3,14,
      C9,2E,F0,0F
HA 490 DATA C9,44,F0,0B,C9,3E,
      F0,04,C9,4D
AJ 500 DATA D0,E0,A9,3E,2C,A9,
      2E,8D,BD,17
EA 510 DATA 20,E1,15,A5,F8,48,
      A9,00,85,F8
JA 520 DATA 20,CE,15,AD,BD,17,
      C9,2E,D0,17
JG 530 DATA A9,11,20,D2,FF,20,
      48,16,20,5D
AH 540 DATA 16,AA,E8,8A,20,52,
      B9,20,D4,B5
PK 550 DATA 4C,0C,15,24,D7,30,
      03,A9,08,2C
MH 560 DATA A9,10,20,52,B9,20,
      E8,B1,20,7D
DS 570 DATA C7,20,7D,FF,1B,4A,
      00,68,85,F8
MB 580 DATA 68,58,60,4C,75,14,
      4C,70,14,20
XX 590 DATA CE,15,4C,A2,15,20,
      E4,FF,C9,20
DH 600 DATA D0,0E,A5,EB,C5,E4,
      F0,ED,A9,8D
MH 610 DATA 20,D2,FF,4C,27,15,
      C9,2E,F0,0F
BH 620 DATA C9,44,F0,0B,C9,3E,
      F0,04,C9,4D
BC 630 DATA D0,E2,A9,3E,2C,A9,
      2E,8D,BD,17
PM 640 DATA 20,E1,15,20,CE,15,
      20,7D,FF,1B
JK 650 DATA 49,00,AD,BD,17,C9,
      2E,D0,29,EA
HA 660 DATA A9,03,8D,C1,17,20,
      33,16,20,48
ES 670 DATA 16,20,5D,16,C9,02,
      F0,10,20,50
HM 680 DATA B9,20,48,16,20,5D,
      16,C9,01,F0
QS 690 DATA 03,20,50,B9,20,D4,
      B5,4C,A2,15
AQ 700 DATA 24,D7,30,03,A9,08,
      2C,A9,10,8D
SJ 710 DATA C1,17,20,33,16,20,
      EB,B1,20,7D
JD 720 DATA C7,20,7D,FF,13,00,
      68,58,60,A9
SH 730 DATA 00,8D,00,FF,A5,EC,
      8D,BF,17,A5
EX 740 DATA EB,8D,BE,17,A9,2C,
      A2,03,A0,00
JA 750 DATA 20,BA,FF,20,C0,FF,-
      A2,2C,20,C6
DR 760 DATA FF,60,A9,2C,20,C3,
      FF,20,CC,FF
DE 770 DATA AD,BF,17,85,EC,AD,
      BE,17,85,EB
PM 780 DATA 60,A9,00,85,66,85,
      67,85,68,20
RC 790 DATA E4,FF,C9,20,D0,03,
      20,E4,FF,C9
JM 800 DATA 20,F0,3B,C9,0D,F0,
      37,38,E9,30
BC 810 DATA 90,32,C9,0A,90,02,
      E9,07,C9,10
AJ 820 DATA B0,28,8D,B5,0A,A2,
      04,06,66,26
HJ 830 DATA 67,26,68,B0,1B,CA,
      D0,F5,18,AD
JA 840 DATA B5,0A,65,66,85,66,
      8A,65,67,85
KR 850 DATA 67,8A,65,68,85,68,
      B0,04,29,F0
QG 860 DATA F0,BE,60,38,A5,66,
      ED,C1,17,85
SR 870 DATA 66,A5,67,E9,00,85,
      67,A5,68,E9
JK 880 DATA 00,85,68,60,A0,00,
      A6,68,8A,29
KG 890 DATA 0F,AA,BD,F0,F7,AA,
      A9,66,8D,AA
GM 900 DATA 02,20,A2,02,60,4A,
      90,09,4A,B0
KK 910 DATA 15,C9,22,29,07,09,
      80,4A,AA,BD
MP 920 DATA C3,B6,B0,04,4A,4A,
      4A,4A,29,0F
EK 930 DATA D0,04,A0,80,A9,00,
      AA,BD,07,B7
PR 940 DATA 29,03,60,20,E9,B8,
      C9,20,F0,F9
BE 950 DATA C9,52,F0,09,C9,57,
      F0,08,68,68
JH 960 DATA 4C,BF,B0,A2,31,2C,
      A2,32,8E,AC
RK 970 DATA 17,8D,BD,17,20,A7,
      B7,B0,0A,A5
RR 980 DATA 60,8D,C1,17,20,A7,
      B7,90,03,4C
AR 990 DATA BC,B0,A5,60,8D,C2,
      17,A9,08,8D
QJ 1000 DATA BC,17,20,A7,B7,B0
       ,05,A5,60,8D
MQ 1010 DATA BC,17,AD,BC,17,C9
       ,04,90,E2,C9
QF 1020 DATA 1F,B0,DE,20,CC,FF
       ,A9,08,20,C3
DF 1030 DATA FF,A9,0F,20,C3,FF
       ,A9,00,A2,0F
RQ 1040 DATA 20,68,FF,A9,02,A2
       ,B8,A0,17,20
GA 1050 DATA BD,FF,A9,0F,AE,BC
       ,17,A0,0F,20
KR 1060 DATA BA,FF,20,C0,FF,B0
       ,18,A9,01,A2
FR 1070 DATA BA,A0,17,20,BD,FF
       ,A9,08,AE,BC
HB 1080 DATA 17,A0,08,20,BA,FF
       ,20,C0,FF,90
```

```
QF 1090 DATA 06,20,92,17,4C,92
        ,16,EA,AD,C1
SH 1100 DATA 17,20,FB,F9,8E,B3
        ,17,8D,B4,17
DA 1110 DATA AD,C2,17,20,FB,F9
        ,8E,B6,17,8D
RH 1120 DATA B7,17,AD,BD,17,C9
        ,57,D0,23,A2
DG 1130 DATA 0F,20,C9,FF,20,7D
        ,FF,42,2D,50
CS 1140 DATA 20,38,20,30,00,20
        ,CC,FF,A2,08
AE 1150 DATA 20,C9,FF,A0,00,B9
        ,00,0B,20,D2
DG 1160 DATA FF,C8,D0,F7,20,A2
        ,17,20,CC,FF
GD 1170 DATA A2,0F,20,C9,FF,A0
        ,00,B9,AB,17
DF 1180 DATA 20,D2,FF,C8,C0,0D
        ,D0,F5,20,CC
FE 1190 DATA FF,AD,BD,17,C9,52
        ,D0,10,A2,08
BH 1200 DATA 20,C6,FF,A0,00,20
        ,CF,FF,99,00
CK 1210 DATA 0B,C8,D0,F7,20,CC
        ,FF,18,A9,08
KC 1220 DATA 20,C3,FF,A9,0F,38
        ,20,C3,FF,60
FH 1230 DATA A0,00,CA,D0,FD,88
        ,D0,FA,60,55
EE 1240 DATA 31,3A,30,38,20,30
        ,20,31,38,20
XS 1250 DATA 30,30,49,30,23,00
        ,08,00,00,00
BP 1260 DATA 00,00,00,"EOD"
```

Rewrite

Article on page 52.

```
BF 100 AD=828
PP 110 PRINT CHR$(147)"REWRITE
       : SELF-MODIFYING BASIC"
       :PRINT
XG 120 PRINT "COPYRIGHT 1989":
       PRINT "COMPUTE! PUBLICA
       TIONS, INC."
HD 130 PRINT "ALL RIGHTS RESER
       VED":PRINT
CS 140 FOR I=AD TO AD+109:READ
        D:POKE I,D:CK=CK+D:NEX
       T
FP 150 IF CK<>13757 THEN PRINT
        "ERROR IN DATA STATEME
       NTS"
HR 160 PRINT "TO USE, ENTER:":
       PRINT "SYS"STR$(AD)",LI
       NE NUMBER,NEW LINE$"
EK 170 DATA 032,253,174,032,13
       8,173,032,247
AP 180 DATA 183,032,019,166,14
       4,090,165,095
PC 190 DATA 133,251,165,096,13
       3,252,032,253
BG 200 DATA 174,032,158,173,03
       2,163,182,170
JP 210 DATA 240,069,201,089,17
       6,069,133,002
FA 220 DATA 160,000,177,034,15
       3,000,002,200
CS 230 DATA 196,002,208,246,16
       9,000,153,000
EB 240 DATA 002,165,122,072,16
       5,123,072,169
MH 250 DATA 000,133,122,169,00
       2,133,123,032
RH 260 DATA 121,165,104,133,12
       3,104,133,122
GH 270 DATA 136,132,002,160,00
       4,177,251,240
QS 280 DATA 014,169,032,196,00
       2,176,003,185
EB 290 DATA 252,001,145,251,20
       0,208,238,096
XP 300 DATA 076,227,168,076,11
       3,165
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

The GEOS Column

See instructions in article on page 44 before typing in.

Program 1: Help Pad ML

```
55FE:00 20 99 5B 20 52 59 A9 41
5606:80 85 2F A9 00 20 39 C1 89
560E:20 9F C1 08 C0 A0 00 30 24
5616:01 20 A8 C1 01 A0 00 08 0F
561E:07 30 01 C0 00 A9 09 20 5F
5626:39 C1 20 9F C1 09 16 A1 DD
562E:00 2F 01 A9 00 20 39 C1 16
5636:A9 08 A0 C0 85 33 84 34 10
563E:A9 A0 A0 00 85 35 84 36 3C
5646:A9 2E A0 01 85 37 84 38 C1
564E:A9 5C A0 56 85 02 84 03 A0
5656:A9 00 20 51 C1 60 09 15 A7
565E:AF 00 21 01 03 72 56 00 A5
5666:DF 56 78 56 00 21 58 82 C4
566E:56 00 E1 5B 1B 4D 41 49 12
5676:4E 00 1B 50 52 45 56 49 50
567E:4F 55 53 00 1B 51 55 49 A4
5686:54 00 00 00 00 25 00 00 F1
568E:00 00 00 00 00 00 00 00 3B
5696:00 00 00 00 00 00 00 00 43
569E:00 00 00 00 00 00 00 00 4B
56A6:00 00 00 00 00 00 00 00 53
56AE:00 00 00 00 00 00 00 00 5B
56B6:00 00 00 00 00 00 00 00 63
56BE:00 00 00 00 00 00 00 00 6B
56C6:00 00 00 00 00 00 00 00 73
56CE:48 45 4C 50 46 49 4C 45 B4
56D6:20 20 20 20 56 31 2E 31 A6
56DE:00 A9 19 8D 72 56 A9 1B 4D
56E6:8D 78 56 20 93 C1 A9 00 3C
56EE:8D 8E 56 8D 8F 56 AD 89 64
56F6:84 8D 91 56 A9 00 A0 50 BF
56FE:85 0E 84 0F A9 07 85 10 F7
5706:A9 01 85 11 A9 CE A0 56 AB
570E:85 16 84 17 20 3B C2 A9 24
5716:00 A0 50 85 02 84 03 20 97
571E:74 C2 E0 00 D0 03 4C 7B 7A
5726:57 EE 8F 56 AD 8F 56 C9 B5
572E:02 F0 1D AD 89 84 C9 08 92
5736:F0 0B A9 08 20 B0 C2 20 3F
573E:A1 C2 4C FA 56 A9 09 20 33
5746:B0 C2 20 A1 C2 4C FA 56 AF
574E:AD 91 56 20 B0 C2 20 A1 77
5756:C2 20 AE C1 A4 00 50 54 7A
575E:48 45 52 45 20 49 53 20 0E
5766:4E 4F 20 48 45 4C 50 46 DA
576E:49 4C 45 20 50 52 45 53 29
5776:45 4E 54 00 60 20 47 5A 52
577E:A9 00 8D 8D 56 8D 8E 56 E8
5786:8D 8A 56 20 80 C2 A9 00 CD
578E:A0 50 85 10 84 11 A9 00 0F
5796:A0 02 85 06 84 07 20 8C 34
579E:C2 20 18 5A A9 FF 8D 90 58
57A6:56 A9 1F A0 50 85 20 84 36
57AE:21 AC 8E 56 B1 20 C9 0C FD
57B6:F0 5D C9 00 F0 59 C9 0D FB
57BE:F0 25 C9 17 F0 0A C9 20 3D
57C6:B0 14 EE 8E 56 4C AF 57 34
57CE:C8 C8 C8 B1 20 85 2E C8 84
57D6:8C 8E 56 4C AF 57 20 45 5F
57DE:C1 EE 8E 56 4C AF 57 AD DE
57E6:90 56 C9 0E F0 29 EE 90 28
57EE:56 A5 05 18 69 0B 85 05 DB
57F6:A5 35 85 18 A5 36 85 19 22
57FE:EE 8E 56 AD 8E 56 18 65 D1
5806:20 85 20 90 02 E6 21 A9 CC
580E:00 8D 8E 56 4C AF 57 A0 C9
5816:00 8C 8E 56 EE 90 56 20 A7
581E:5C 58 60 AD 8D 56 D0 04 65
5826:20 93 C1 60 C9 80 F0 11 4D
582E:A9 1B 8D 78 56 A9 19 8D CC
5836:72 56 20 93 C1 20 7B 57 CF
583E:60 20 47 5A A9 FF 8D 8D AB
5846:56 A9 1B 8D 72 56 A9 19 22
584E:8D 78 56 20 93 C1 AD 8A 3A
5856:56 20 89 57 60 00 AD 90 CF
585E:56 0A 0A 6D 90 56 6D 90 1E
5866:56 A8 A9 FF 99 00 55 88 A1
586E:B9 F7 58 99 00 55 88 C0 C5
5876:FF F0 02 D0 F3 20 6C 59 03
587E:60 AD 8D 56 C9 FF F0 32 44
5886:C9 00 D0 0D A9 19 A0 1B 15
588E:8D 78 56 8C 72 56 20 93 78
5896:C1 20 C1 58 20 9F C1 1D 0E
589E:BF A1 00 2F 01 20 47 5A FB
58A6:A9 FF 8D 8D 56 AD CF 59 19
58AE:8D 8C 56 8D 8A 56 20 89 64
58B6:57 60 A9 80 8D 8D 56 20 D7
58BE:5B 5A 60 AD 90 56 EE CF 26
58C6:59 6D CF 59 20 80 C2 A9 41
58CE:00 A0 54 85 08 84 09 20 0F
58D6:05 C2 60 7F 58 7F 58 7F AF
58DE:58 7F 58 7F 58 7F 58 7F 8F
58E6:58 7F 58 7F 58 7F 58 7F 97
58EE:58 7F 58 7F 58 7F 58 7F 9F
58F6:58 1D 27 A1 00 2F 01 28 01
58FE:32 A1 00 2F 01 33 3D A1 15
5906:00 2F 01 3E 48 A1 00 2F 80
590E:01 49 53 A1 00 2F 01 54 2B
5916:5E A1 00 2F 01 5F 69 A1 4D
591E:00 2F 01 6A 74 A1 00 2F BC
5926:01 75 7F A1 00 2F 01 80 FF
592E:8A A1 00 2F 01 8B 95 A1 84
5936:00 2F 01 96 A0 A1 00 2F F8
593E:01 A1 AB A1 00 2F 01 AC D4
5946:B6 A1 00 2F 01 B7 BD A1 B3
594E:00 2F 01 FF EA A9 5F A0 4A
5956:59 85 02 84 03 20 5A C1 AE
595E:60 01 A0 00 64 00 00 0A C2
5966:0A 01 01 00 00 00 A9 77 49
596E:A0 59 8D A9 84 8C AA 84 44
5976:60 AD 05 85 10 01 60 EA ED
597E:A9 00 A0 55 85 20 84 21 46
5986:A2 FF 86 1E A0 00 B1 20 C5
598E:C0 06 D0 13 C9 FF F0 38 D6
5996:98 18 65 20 85 20 90 02 1A
599E:E6 21 A0 00 4C 8C 59 99 02
59A6:06 00 C8 C0 06 D0 DF E6 9B
59AE:1E 20 B3 C2 10 D8 A5 1E 68
59B6:8D CF 59 0A A8 B9 D9 58 28
59BE:8D D1 59 C8 B9 D9 58 8D D7
59C6:D2 59 20 2A C1 20 D0 59 69
59CE:60 00 4C 00 00 A5 1E C9 D7
59D6:0D B0 3E AD 6B 59 C9 FF 33
59DE:F0 19 0A 0A 6D 6B 59 6D 6B
59E6:6B 59 AA A0 00 B5 00 99 75
59EE:06 00 E8 C8 C0 06 D0 F5 04
59F6:20 2A C1 A5 1E 0A 0A 65 69
59FE:1E 65 1E AA A0 00 B5 00 F8
5A06:99 06 00 E8 C8 C0 06 D0 BD
5A0E:F5 20 2A C1 A5 1E 8D 6B 53
5A16:59 60 20 9F C1 19 BF A1 21
5A1E:00 2F 01 A9 0A A0 BF 85 31
5A26:33 84 34 A9 A4 A0 00 85 E3
5A2E:35 84 36 A9 2E A0 01 85 7B
5A36:37 84 38 AD 8B 56 85 05 4F
5A3E:A5 35 A4 36 85 18 84 19 B9
5A46:60 A9 00 A0 50 85 04 84 C4
5A4E:05 A9 FF A0 01 85 02 84 A0
5A56:03 20 78 C1 60 20 9F C1 44
5A5E:3B BC A1 00 2F 01 20 A8 7A
```

```
5A66:C1 01 A1 00 3B 02 30 01 B3
5A6E:3B 00 A9 A4 A0 00 85 35 85
5A76:84 36 A9 2A A0 01 85 37 1E
5A7E:84 38 A9 3B 85 33 AD CF 90
5A86:59 0A AA BD 00 54 85 04 FB
5A8E:8D 88 56 E8 BD 00 54 85 A1
5A96:05 8D 89 56 A9 00 A0 50 A6
5A9E:85 0A 84 0B 20 E4 C1 E0 D2
5AA6:00 F0 0A 20 00 00 20 77 92
5AAE:C2 20 FF 55 60 EA A9 02 26
5AB6:A0 50 85 20 84 21 20 D5 41
5ABE:5A 20 21 5A A9 00 8D A9 84
5AC6:84 8D AA 84 20 93 C1 60 F1
5ACE:00 00 00 00 00 00 00 EA 6E
5AD6:A9 05 A0 5B 8D AB 84 8C 1C
5ADE:AC 84 A5 33 69 0A 85 05 76
5AE6:A5 35 A4 36 85 18 84 19 62
5AEE:A0 00 B1 20 C9 00 F0 0E 6A
5AF6:20 45 C1 E6 20 A5 20 D0 5C
5AFE:02 E6 21 4C EE 5A 60 A0 99
5B06:00 B1 20 C9 20 F0 1B A0 65
5B0E:00 B1 20 C9 20 F0 16 20 E2
5B16:C9 C1 20 71 5B C6 20 A5 19
5B1E:20 C9 FF D0 02 C6 21 4C 1E
5B26:0D 5B 4C 63 5B 20 81 5B B3
5B2E:A9 20 20 B1 C1 85 06 A5 B6
5B36:05 85 07 E5 06 85 06 A5 08
5B3E:18 A4 19 85 08 84 09 85 8F
5B46:1A 84 1B A5 37 A4 38 85 2B
5B4E:0A 84 0B 20 24 C1 A0 00 F7
5B56:B9 91 5B 99 33 00 C0 06 74
5B5E:F0 03 C8 D0 F3 A5 1A A4 83
5B66:1B 85 18 84 19 A9 0D 20 01
5B6E:45 C1 60 8D D3 5A 38 A5 3B
5B76:18 ED D3 5A B0 02 C6 19 09
5B7E:85 18 60 A0 00 B9 33 00 61
5B86:99 91 5B C0 06 F0 03 C8 A8
5B8E:D0 F3 60 00 00 00 00 00 B6
5B96:00 00 00 A5 16 8D DF 5B A9
5B9E:A9 3C A0 8C 85 02 84 03 56
5BA6:A9 00 A0 52 8D DD 5B 8C 92
5BAE:DE 5B A0 00 8C E0 5B A2 01
5BB6:00 A9 0F 91 02 C0 11 F0 F8
5BBE:03 C8 D0 F5 EE E0 5B AD 02
5BC6:E0 5B C9 17 F0 10 18 A9 11
5BCE:28 65 02 85 02 90 02 E6 C8
5BD6:03 A0 00 4C B7 5B 60 00 E7
5BDE:00 00 00 AD DF 5B 29 40 6F
5BE6:20 77 C2 AD 91 56 CD 89 C9
5BEE:84 F0 06 20 B0 C2 20 A1 59
5BF6:C2 4C 3E C2 01 FF EA A9 9D
5BFE:5F A0 00 00 00 00 00 00 8D
```

Program 2: Help Grabber

```
0400:BF FF FF FF 80 00 01 80 6E
0408:7F 01 80 08 01 80 08 01 BB
0410:80 08 01 80 7C 01 82 4A B9
0418:01 82 49 01 81 F1 01 80 D0
0420:41 01 BF E1 01 82 41 01 B4
0428:82 41 01 82 42 01 82 7C A1
0430:01 82 00 01 82 00 01 82 02
0438:C0 01 80 00 01 FF FF FF F8
0440:83 06 00 FC 04 57 09 FC E7
0448:04 48 45 4C 50 46 49 4C 4C
0450:45 20 20 20 20 56 31 2E F3
0458:32 00 00 00 00 CA 41 4D 74
0460:45 53 20 C4 2E 20 D4 55 21
0468:42 42 53 00 00 00 00 00 8C
0470:00 00 00 00 00 00 00 00 78
0478:00 00 00 00 00 00 00 00 80
0480:00 00 00 00 00 00 00 00 88
0488:00 00 00 00 00 00 00 00 90
0490:00 00 00 00 00 00 00 00 98
0498:00 00 00 00 00 00 00 00 A0
04A0:00 00 00 00 00 00 00 00 A8
04A8:00 00 00 00 00 00 00 00 B0
04B0:00 00 00 00 00 00 00 00 B8
04B8:00 00 00 00 00 00 00 00 C0
04C0:00 00 00 00 00 00 00 00 C8
04C8:00 00 00 00 00 00 00 00 D0
04D0:00 00 00 00 00 00 00 00 D8
04D8:00 00 00 00 00 00 00 00 E0
04E0:00 00 00 00 00 00 00 00 E8
04E8:00 00 00 00 00 00 00 00 F0
04F0:00 00 00 00 00 00 00 00 F8
04F8:00 00 00 00 20 29 08 A9 60
0500:00 20 39 C1 20 9F C1 00 58
0508:C7 00 00 3F 01 A9 1B A0 6F
0510:05 85 02 84 03 A9 01 20 67
0518:51 C1 60 0E 1C 00 00 4B 54
0520:00 03 31 05 00 41 05 34 A4
0528:05 00 3E 05 39 05 00 B8 63
0530:07 4F 4B 00 51 55 49 54 C1
0538:00 49 4E 46 4F 00 4C 2C 02
0540:C2 20 93 C1 20 47 07 20 8E
0548:56 07 A9 42 A0 08 85 14 DC
0550:84 15 20 ED C1 A0 00 B9 0F
0558:56 09 99 64 05 C9 00 F0 89
0560:17 C8 D0 F3 00 00 00 00 81
0568:00 00 00 00 00 00 00 00 72
0570:00 00 00 00 00 00 00 00 7A
0578:A9 07 85 10 A9 D3 A0 05 AD
0580:85 0C 84 0D A9 E7 A0 05 E4
0588:85 16 84 17 20 95 07 A9 EB
0590:00 8D F8 05 A9 FF 8D FB D1
0598:05 A9 D3 A0 05 85 02 84 DA
05A0:03 20 74 C2 20 7A C2 F0 50
05A8:FB 20 42 09 A9 00 A0 20 40
05B0:85 10 84 11 A9 00 A0 14 C5
05B8:85 06 84 07 AD F8 05 20 83
05C0:80 C2 20 8C C2 F0 06 20 8E
05C8:FC 05 4C 99 05 CE F8 05 10
05D0:4C 39 06 00 00 00 00 00 10
05D8:00 00 00 00 00 00 00 00 E2
05E0:00 00 00 00 00 00 00 57 42
05E8:72 69 74 65 20 49 6D 61 CD
05F0:67 65 20 56 32 2E 30 00 1C
05F8:00 00 00 00 20 77 C2 A9 11
0600:56 A0 09 85 02 84 03 20 21
0608:74 C2 20 7A C2 8A F0 FA C7
0610:EE FB 05 20 89 C2 A5 11 E8
0618:38 E9 20 85 07 A5 10 85 8B
0620:06 A9 00 A0 20 85 10 84 5F
0628:11 20 8F C2 20 77 C2 EE 36
0630:F8 05 60 4E 6F 74 65 73 76
0638:00 20 77 C2 A9 01 8D FA CE
0640:05 A9 07 85 10 A9 D3 A0 E1
0648:05 85 0C 84 0D A9 33 A0 18
0650:06 85 16 84 17 20 95 07 37
0658:A9 D3 A0 05 85 02 84 03 D2
0660:20 74 C2 A9 02 8D F9 05 CB
0668:A0 20 A9 00 85 FB 84 FC 24
0670:A9 00 A0 80 85 0A 84 0B D5
0678:AC F9 05 B9 00 81 C9 00 2F
0680:F0 3A 85 04 C8 B9 00 81 33
0688:85 05 20 E4 C1 A9 02 A0 44
0690:80 85 02 84 03 A5 FB A4 12
0698:FC 85 04 84 05 A9 FE A0 BA
06A0:00 85 06 84 07 20 7E C1 8E
06A8:18 A5 FB 69 FE 85 FB 90 D6
06B0:02 E6 FC EE F9 05 EE F9 C1
06B8:05 4C 70 06 20 77 C2 38 65
06C0:A5 FC E9 20 85 FC A9 56 E7
06C8:A0 09 85 02 84 03 20 74 1D
06D0:C2 20 7A C2 8A F0 FA 20 EF
06D8:89 C2 A9 00 A0 20 85 10 30
06E0:84 11 A5 FB A4 FC 85 06 12
06E8:84 07 20 8F C2 EE F8 05 BE
06F0:AD FA 05 CD FB 05 F0 09 EE
06F8:20 77 C2 EE FA 05 4C 41 FF
0700:06 20 77 C2 20 A8 C1 01 5C
0708:32 00 32 07 0D 01 95 00 7D
0710:20 AE C1 3C 00 3E 18 43 42
0718:4F 4E 56 45 52 53 49 4F 42
0720:4E 20 4F 46 20 48 45 4C A4
0728:50 46 49 4C 45 00 20 AE F6
0730:C1 3C 00 48 49 53 20 4E D8
0738:4F 57 20 43 4F 4D 50 4C 98
0740:45 54 45 2E 1B 00 60 A0 CB
0748:00 A9 00 99 56 09 C8 C0 83
0750:14 F0 02 D0 F6 60 A9 56 D4
0758:A0 09 85 16 84 17 A9 76 55
0760:A0 07 85 02 84 03 20 56 18
0768:C2 A5 02 C9 02 D0 06 20 9D
0770:77 C2 4C 2C C2 60 81 0D DE
0778:0A 1E 16 10 02 11 48 0B C6
0780:0A 12 85 07 00 45 4E 54 3F
0788:45 52 20 46 49 4C 45 4E 8A
0790:41 4D 45 3A 00 A9 AD A0 81
0798:07 85 02 84 03 20 56 C2 1C
07A0:A5 02 C9 02 F0 01 60 20 C7
07A8:77 C2 4C 2C C2 81 10 04 AF
07B0:04 05 11 08 02 11 48 00 89
07B8:20 93 C1 A9 C7 A0 07 85 E2
07C0:02 84 03 20 56 C2 60 81 53
07C8:0E 0B 05 14 E3 07 0B 05 D8
07D0:28 F4 07 0B 05 32 FF 07 B9
07D8:0B 05 3C 0C 08 0B 05 46 B2
07E0:1A 08 00 18 19 1A 20 48 39
07E8:45 4C 50 46 49 4C 45 52 73
07F0:20 20 1B 00 18 4A 49 4D 44
07F8:20 54 55 42 42 53 00 50 AA
0800:2E 4F 2E 20 42 4F 58 20 E2
0808:34 37 38 00 45 4C 4B 20 19
0810:50 41 52 4B 2C 20 4E 43 59
0818:2E 00 20 20 20 20 20 20 27
0820:20 20 32 38 36 32 32 1B 0C
0828:00 EA A9 36 A0 08 85 02 BD
0830:84 03 20 5A C1 60 01 A0 1F
0838:00 64 00 00 0A 0A 01 01 DC
0840:00 00 56 09 03 15 BF 00 97
0848:00 24 00 00 3C 3F FF 3C 7C
0850:20 01 24 3F FF 00 20 01 6A
0858:3C 20 01 20 20 01 38 20 46
0860:01 20 20 01 3C 20 01 00 71
0868:20 01 20 20 01 20 30 01 B8
0870:20 28 01 3C 24 01 00 22 C5
0878:01 38 3F FF 24 00 00 38 58
0880:00 00 20 00 00 20 83 07 23
0888:01 00 00 FF FF 00 00 48 61
0890:45 4C 50 46 49 4C 45 20 EA
0898:20 20 20 56 31 2E 31 00 CE
08A0:00 00 00 00 00 00 00 00 B0
08A8:00 00 00 00 00 00 00 00 B8
08B0:00 00 00 00 00 00 00 00 C0
08B8:00 00 00 00 00 00 00 00 C8
08C0:00 00 00 00 00 00 00 00 D0
08C8:00 00 00 00 00 00 00 00 D8
08D0:00 00 00 00 00 00 00 00 E0
08D8:00 00 00 00 00 00 00 00 E8
08E0:00 00 00 00 00 00 00 00 F0
08E8:00 00 00 00 00 00 00 00 F8
08F0:00 00 00 00 00 00 00 00 01
08F8:00 00 00 00 00 00 00 00 09
0900:00 00 00 00 00 00 00 00 12
0908:00 00 00 00 00 00 00 00 1A
0910:00 00 00 00 00 00 00 00 22
0918:00 00 00 00 00 00 00 00 2A
0920:00 00 00 00 00 00 00 00 32
0928:00 00 00 00 00 00 00 00 3A
0930:00 00 00 00 00 00 00 00 42
0938:00 00 00 00 00 00 00 00 4A
0940:00 00 A9 00 A0 04 85 02 A9
0948:84 03 A9 00 A0 50 85 04 E7
0950:84 05 20 78 C1 60 00 00 01
```

Program 3: Note Converter

```
5000:BF FF FF FF 80 00 01 80 07
5008:7F 01 80 08 01 80 08 01 54
5010:80 08 01 80 7C 01 82 4A 52
5018:01 82 49 01 81 F1 01 80 69
5020:41 01 BF E1 01 82 41 01 4D
5028:82 41 01 82 42 01 82 7C 3A
5030:01 82 00 01 82 00 01 82 9A
5038:C0 01 80 00 01 FF FF FF 91
5040:83 05 00 FC 50 57 51 FC 33
5048:50 48 45 4C 50 46 49 4C 0B
5050:45 20 20 20 20 56 31 2E 8C
5058:32 00 00 00 00 CA 41 4D 0D
5060:45 53 20 C4 2E 20 D4 55 B9
5068:42 42 53 00 00 00 00 00 25
5070:00 00 00 00 00 00 00 00 11
5078:00 00 00 00 00 00 00 00 19
5080:00 00 00 00 00 00 00 00 21
5088:00 00 00 00 00 00 00 00 29
5090:00 00 00 00 00 00 00 00 31
5098:00 00 00 00 00 00 00 00 39
```

```
50A0:00 00 00 00 00 00 00 00 41
50A8:00 00 00 00 00 00 00 00 49
50B0:00 00 00 00 00 00 00 00 51
50B8:00 00 00 00 00 00 00 00 59
50C0:00 00 00 00 00 00 00 00 61
50C8:00 00 00 00 00 00 00 00 69
50D0:00 00 00 00 00 00 00 00 71
50D8:00 00 00 00 00 00 00 00 79
50E0:00 00 00 00 00 00 00 00 81
50E8:00 00 00 00 00 00 00 00 89
50F0:00 00 00 00 00 00 00 00 91
50F8:00 00 00 00 EA A9 4F A0 D6
5100:51 85 0E 84 0F 20 0B C2 88
5108:A0 16 A9 07 91 0C A9 00 36
5110:A0 80 85 0A 84 0B A5 0C 1C
5118:A4 0D 8D 55 51 8C 56 51 12
5120:20 E7 C1 AD 55 51 AC 56 7F
5128:51 85 14 84 15 20 29 C2 DD
5130:A0 45 A9 07 99 00 81 AD 97
5138:00 84 AC 01 84 85 04 84 68
5140:05 A9 00 A0 81 85 0A 84 94
5148:0B 20 E7 C1 4C 3E C2 4E C0
5150:6F 74 65 73 00 00 00 00 AB
```

Program 4: Help Pad BASIC

```
HJ 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC.
      {2 SPACES}ALL RIGHTS RES
      ERVED.
RB 20 IFA=0THENA=1:PRINT"LOADI
      NG HELPPAD.ML":LOAD"0:HE
      LPPAD.ML",8,1
MC 30 PRINT"POKING IN DATA"
CK 40 FOR J=20224 TO 20330:REA
      D A:POKE J,A:CK=CK+A:NEX
      T
SH 50 FOR J=20331 TO 22014:POK
      E J,0:NEXT
AC 60 FOR J=20476 TO 20478
SR 70 READ A:POKE J,A:CK=CK+A:
      NEXT:IF CK<>9532 THEN PR
      INT"ERROR IN DATA":STOP
DA 80 PRINT"SAVING HELP PAD TO
       DISK"
MM 90 OPEN1,8,1,"0:HELP PAD"
XS 100 SA=20224:EA=23552
QP 110 POKE193,SA-INT(SA/256)*
       256:POKE194,SA/256:POKE
       780,193
MD 120 POKE781,EA-INT(EA/256)*
       256:POKE782,EA/256:SYS6
       5496
HE 130 CLOSE1:PRINT"SAVE COMPL
       ETE":END
BD 20224 DATA 191,255,255,255,
         128,000
EF 20230 DATA 001,128,127,001,
         128,008
EF 20236 DATA 001,128,008,001,
         128,008
CS 20242 DATA 001,128,124,001,
         130,074
GB 20248 DATA 001,130,073,001,
         129,241
QJ 20254 DATA 001,128,065,001,
         191,225
EX 20260 DATA 001,130,065,001,
         130,065
KE 20266 DATA 001,130,066,001,
         130,124
JK 20272 DATA 001,130,000,001,
         130,000
XE 20278 DATA 001,130,192,001,
         128,000
DR 20284 DATA 001,255,255,255,
         131,005
AE 20290 DATA 000,252,079,250,
         091,252
JF 20296 DATA 079,072,069,076,
         080,070
FR 20302 DATA 073,076,069,032,
         032,032
JP 20308 DATA 032,086,049,046,
         050,000
CH 20314 DATA 000,000,000,202,
         065,077
QS 20320 DATA 069,083,032,196,
         046,032
XX 20326 DATA 212,085,066,066,
         083
AG 20476 DATA 076,255,085
```

Program 5: GeoConverter

```
HE 10 REM COPYRIGHT 1988 COMPU
      TE! PUBLICATIONS, INC. -
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XG 20 REM THIS IS THE UPDATED
      {SPACE}GEOCONVERTER
      {8 SPACES}REVISED MAY IS
      SUE 1988 GAZETTE
AC 30 POKE 53280,0:POKE 53281,
      0:POKE 646,5:PRINTCHR$(1
      42);CHR$(147)
PS 40 FORI=1TO10:PRINT"{DOWN}"
      :NEXT
DX 50 PRINTTAB(5)"{4}UDI COPYR
      IGHT 1988"
SP 60 PRINTTAB(5)"GCH COMPUTE!
       PUBLICATIONS INC."
SP 70 PRINTTAB(5)"JFK ALL RIGH
      TS RESERVED{HOME}"
EP 80 PRINT"{DOWN}{RVS}{8}GEOC
      ONVERTER 1.1{OFF}{DOWN}
      {GRN}"
AP 90 INPUT"FILE TO CONVERT";G
      F$
CX 100 PRINT"{DOWN}SEARCHING F
       OR "GF$
PA 110 HD$="":FOR I=1 TO 4:REA
       D HE:HD$=HD$+CHR$(HE):N
       EXT
FK 120 FOR I=1TO5:READIE:ID$=I
       D$+CHR$(IE):NEXT
GD 130 NL$="":T$=CHR$(18):S$=C
       HR$(1):OPEN 15,8,15,"I0
       :":OPEN 2,8,2,"#"
JX 140 GOSUB370:GET #2,NT$,NS$
KB 150 FOR E=0 TO 7
KQ 160 D$=NL$:GET#2,B$:I=1:IFB
       $=NL$ THEN220
AX 170 IF ASC(B$)<>130 THEN220
HM 180 GET#2,HT$,HS$:I=3:IF HS
       $="" THEN HS$=CHR$(0)
FH 190 GET#2,B$:I=I+1:IF B$=""
        THEN B$=CHR$(0)
FA 200 IF ASC(B$)=160 THEN220
GD 210 D$=D$+B$:GOTO190
RK 220 FOR I=I TO 31:GET#2,B$:
       NEXT
AX 230 IF D$=GF$ THEN260
EC 240 NEXT E:IF NT$=NL$ THEN2
       60
FX 250 T$=NT$:S$=NS$:GOTO140
CR 260 IF D$=NL$ THENPRINT"
       {DOWN}{RVS}FILE NOT FOU
       ND{OFF}":GOTO360
CP 270 PRINT"{DOWN}CONVERTING
       {SPACE}"GF$
MJ 280 DT$=T$:DS$=S$:T$=HT$:S$
       =HS$:GOSUB370
MB 290 GET#2,MT$,MS$:IF MS$=""
        THEN MS$=CHR$(0)
BM 300 FOR I=0 TO 65:GET #2,B$
       :NEXT
HG 310 GET#2,CT$,GT$:GOSUB370:
       PRINT#2,HD$;:GOSUB380:T
       $=DT$:S$=DS$:GOSUB370
FP 320 FOR I=0 TO 32*E+2:GET#2
       ,B$:NEXT
FQ 330 PRINT#2,MT$;MS$;:FORI=0
        TO 15:GET#2,B$:NEXT
GP 340 PRINT#2,HT$;HS$;CHR$(0)
       ;GT$;
KM 350 PRINT#2,ID$;:GOSUB380:P
       RINT:PRINTGF$" CONVERTE
       D"
ER 360 CLOSE2:CLOSE15:END
KA 370 U$="U1":GOTO390
RR 380 U$="U2"
KP 390 PRINT#15,U$;2;0;ASC(T$+
       "0");ASC(S$+"0")
AS 400 RETURN
FM 410 DATA 0,255,3,21,87,10,1
       ,0,0
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Grafix Converter

Article on page 37.

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
RR 20 POKE52,88:POKE56,88:CLR
DH 30 FORI=828TO863:READJ:POKE
      I,J:NEXT
RH 40 FORI=1TO4:READHI$(I):NEX
      T:FORI=1TO7:READMU$(I):N
      EXT
BE 50 POKE53280,.:POKE53281,.:
      L=828:LL=835:LH=837:FL=8
      44:C=847
AP 60 T$(.)="{RVS}{RED}":T$(1)
      ="{RVS}{YEL}"
XA 70 PRINT"{CLR}":FORI=1TO3:P
      RINTSPC(5)T$(.)"
      {18 SPACES}":NEXT
CC 80 PRINTSPC(5)"{RVS}{RED} G
      RAFIX CONVERTER "
XE 90 FORI=1TO3:PRINTSPC(5)T$(
      .)"{18 SPACES}":NEXT
QF 100 PRINT"{2 UP}"SPC(12)T$(
       1)"{27 SPACES}"
GM 110 PRINTSPC(12)T$(1)"
       {6 SPACES}COPYRIGHT 198
       9{7 SPACES}"
RE 120 PRINTSPC(12)T$(1)" COMP
       UTE! PUBLICATIONS,INC "
HC 130 PRINTSPC(12)T$(1)"
       {4 SPACES}ALL RIGHTS RE
       SERVED{4 SPACES}"
EJ 140 PRINTSPC(12)T$(1)"
       {27 SPACES}"
EX 150 PRINT"{3 DOWN}{WHT}"SPC
       (17)"CHOOSE"
XB 160 PRINT"{2 DOWN}{RIGHT}
       {7}1. HIRES":PRINT"
       {DOWN}{RIGHT}{6}2. MULT
       I":PRINT"{DOWN}{RIGHT}
       {3}3. QUIT"
MD 170 GOSUB1370
XC 180 IFA$<"1"ORA$>"3"THEN170
QJ 190 A=VAL(A$):IFA=3THENEND
CF 200 PRINT"{CLR}{3 DOWN}
       {WHT}";:IFA=2THEN220
FP 210 FORI=1TO4:PRINTI"{LEFT}
       . "HI$(I):NEXT:GOTO230
PQ 220 FORI=1TO7:PRINTI"{LEFT}
       . "MU$(I):NEXT
CS 230 PRINT"{5 DOWN}
       {3 SPACES}FROM: ";
BB 240 GOSUB1370:IFA$<"1"ORA$>
       "7"THEN240
```

```
PD 250 F=VAL(A$):IFF>4ANDA=1TH
       EN240
QF 260 IFA=2THEN280
GJ 270 PRINTHI$(F):GOTO290
BQ 280 PRINTMU$(F)
JD 290 PRINT"{DOWN}{5 SPACES}T
       O: ";
GQ 300 GOSUB1370:IFA$<"1"ORA$>
       "7"THEN300
JE 310 T=VAL(A$):IFT>4ANDA=1TH
       EN300
KD 320 IFT=FTHEN300
JH 330 IFA=2THEN350
FQ 340 PRINTHI$(T):GOTO360
KQ 350 PRINTMU$(T)
SE 360 P$="":INPUT"{CLR}
       {2 DOWN}{2 RIGHT}NAME O
       F PICTURE";P$:IFP$="<"T
       HEN70
KK 370 IFP$=""THEN360
FG 380 E$=P$:X=.
RK 390 IFA=2THEN410
DG 400 ONFGOSUB890,900,910,920
       :GOTO420
KX 410 ONFGOSUB930,970,1040,10
       50,1060,1070,1080
RM 420 P$=E$:IFLEN(P$)>16THEN3
       60
FE 430 PRINT:POKELL,X:POKELH,Y
EB 440 N$="":INPUT"{2 DOWN}
       {2 RIGHT}NAME OF NEW PI
       CTURE";N$:IFN$="<"THEN7
       0
ED 450 IFN$=""THENPRINT"{3 UP}
       ";:GOTO440
RR 460 E$=N$:IFA=2THEN480
CX 470 ONTGOSUB890,900,910,920
       :GOTO490
EE 480 ONTGOSUB940,970,1040,10
       50,1060,1070,1080
RP 490 N$=E$:IFLEN(N$)>16THEN4
       40
AE 500 GOSUB1260
JD 510 GOSUB1370:IFA$="<"THEN7
       0
PF 520 IFA$<>CHR$(13)THEN510
QH 530 SYSL,P$,8
KS 540 GOSUB1290:GOSUB1280
JQ 550 GOSUB1370:IFA$="<"THEN7
       0
XS 560 IFA$<>CHR$(13)THEN550
GD 570 PRINT"{2 DOWN}
       {4 SPACES}WORKING...
       {DOWN}":BM=24576:N$=N$+
       ",P,W":LN=.:IFA=2THEN59
       0
CS 580 ONFGOSUB1090,1100,1110,
       1120:GOTO600
FX 590 ONFGOSUB1130,1140,1150,
       1160,1170,1180,1190
BH 600 IFA=2THEN620
GE 610 ONTGOSUB640,680,690,700
       :CLOSE2:GOTO630ADY.
PD 620 ONTGOSUB740,750,770,800
       ,820,840,860:CLOSE2
CF 630 GOSUB1290:GOTO70
DP 640 HN=92:GOSUB1200:IFF=2TH
       ENPRINT"SCREEN...":FORI
       =1TO1024:PRINT#2,CHR$(1
       );:NEXT
RK 650 IFF=3THENPRINT"SCREEN..
       .":FORI=1TO1024:PRINT#2
       ,CHR$(16);:NEXT
RH 660 IFF=4THENGOSUB1230:NL=2
       4:GOSUB1210
PX 670 GOSUB1220:RETURN
RB 680 HN=32:GOSUB1200:GOSUB12
       20:RETURN
MD 690 HN=64:GOSUB1200:GOSUB12
       20:NL=64:GOSUB1210:RETU
       RN
DM 700 HN=32:GOSUB1200:GOSUB12
       20:IFF=1THENGOSUB1230
AM 710 IFF=2THENPRINT"SCREEN..
       .":FORI=.TO999:PRINT#2,
       CHR$(1);:NEXT
RS 720 IFF=3THENPRINT"SCREEN..
       .":FORI=.TO999:PRINT#2,
       CHR$(16);:NEXT
PK 730 PRINT#2,CHR$(BO);:NL=6:
       GOSUB1210:RETURN
FB 740 HN=96:GOSUB1200:GOSUB12
       20:GOSUB1230:GOSUB1240:
       GOSUB1250:RETURN
AC 750 HN=128:GOSUB1200:GOSUB1
       220:GOSUB1230:GOSUB1240
XF 760 PRINT#2,CHR$(241);CHR$(
       255);CHR$(0);CHR$(1);CH
       R$(7);:RETURN
SF 770 HN=64:GOSUB1200:GOSUB12
       20:NL=192:GOSUB1210:GOS
       UB1230
MA 780 NL=24:GOSUB1210:GOSUB12
       40:NL=22:GOSUB1210
PE 790 PRINT#2,CHR$(BO);:GOSUB
       1250:RETURN
PR 800 HN=92:GOSUB1200:GOSUB12
       30:NL=24:GOSUB1210
FK 810 GOSUB1220:GOSUB1240:NL=
       16:GOSUB1210:RETURN
RJ 820 HN=160:GOSUB1200:GOSUB1
       220:NL=64:GOSUB1210:GOS
       UB1250
PA 830 NL=127:GOSUB1210:GOSUB1
       230:NL=24:GOSUB1210:GOS
       UB1240:GOSUB1210:RETURN
PK 840 HN=32:GOSUB1200:GOSUB12
       20:GOSUB1230:PRINT#2,CH
       R$(BO);:GOSUB1250
PB 850 NL=14:GOSUB1210:GOSUB12
       40:RETURN
GG 860 LN=220:HN=24:GOSUB1200
MF 870 PRINT#2,CHR$(ABS(254-BG
       ));:NL=19:GOSUB1210
QS 880 GOSUB1230:GOSUB1240:GOS
       UB1220:RETURN
EJ 890 E$="DD"+E$:Y=92:RETURN:
       DOODLE
BP 900 E$=E$+".PIC":Y=96:RETUR
       N:PAINT NOW!
JC 910 Y=96:RETURN:PRINT SHOP
XK 920 E$=E$+"{11 SPACES}":E$=
       LEFT$(E$,11)+"
       {2 SPACES}PIC":Y=96:RET
       URN:ART STUDIO, 11 SPAC
       ES
SH 930 E$="?PIC ? "+E$+"*":GOT
       O960:KOALA READ
FF 940 E$="{1}PIC A "+E$+"
       {8 SPACES}"
AG 950 E$=LEFT$(E$,15)+CHR$(16
       0)
FS 960 Y=96:RETURN
BS 970 Q$="":FORI=1TOLEN(E$)
KC 980 R$=MID$(E$,I,1):R=ASC(R
       $):IFR>64THENR=R+32
QP 990 Q$=Q$+CHR$(R):NEXT
JB 1000 IFT=2THEN1020
MH 1010 E$="[CRT?>"+Q$+"*":GOT
       O1030:READ
BD 1020 E$="[CRT0>"+Q$+"
       {9 SPACES}":E$=LEFT$(E
       $,16)
PX 1030 Y=96:RETURN
QG 1040 E$="P-"+E$:Y=96:RETURN
       :ARTIST 64
JX 1050 E$="RP."+E$:Y=92:RETUR
       N:RAINBOW PAINTER
DP 1060 E$="PI."+E$:Y=96:RETUR
       N:BLAZING PADDLES
GA 1070 E$=E$+"{11 SPACES}":E$
       =LEFT$(E$,12)+"MPIC":Y
       =96:RETURN:ADV ART STU
       DIO
DM 1080 E$="PIC."+E$:X=220:Y=8
       8:RETURN:MICRO ILLUSTR
       ATOR
QP 1090 SC=23552:RETURN:DOODLE
AA 1100 SC=23552:POKEC,1:SYSFL
       :RETURN:PAINT NOW!
BB 1110 SC=23552:POKEC,16:SYSF
       L:RETURN:PRINT SHOP
QP 1120 BO=PEEK(33576):SC=3257
       6:RETURN:ART STUDIO
GJ 1130 BG=PEEK(34576):SC=3257
       6:CR=33576:RETURN:KOAL
       A
FF 1140 BO=2:BG=1:SC=32576:CR=
       33576:RETURN:GARFIELD
XX 1150 BO=PEEK(34814):BG=PEEK
       (34815):SC=32768:CR=33
       792:RETURN:ARTIST 64
FB 1160 SC=23552:CR=32576:RETU
       RN:RAINBOW PAINTER
QP 1170 BG=PEEK(32640):SC=3276
       8:CR=33792:RETURN:BLAZ
       ING PADDLES
AQ 1180 BO=PEEK(33576):BG=PEEK
       (33577):SC=32576:CR=33
       592:RETURN:ADV ART STU
       DIO
SA 1190 BG=ABS(254-PEEK(22748)
       ):BM=24768:SC=22768:CR
       =23768:RETURN:MICRO IL
       LUSTRATOR
GH 1200 OPEN2,8,2,N$:PRINT#2,C
       HR$(LN);CHR$(HN);:RETU
       RN:OPEN FILE, SET LOAD
        ADDRESS
HE 1210 PRINT"PADDING...":FORI
       =1TONL:PRINT#2,CHR$(0)
       ;:NEXT:RETURN:PADDING
CF 1220 PRINT"BITMAP...":FORI=
       .TO7999:PRINT#2,CHR$(P
       EEK(BM+I));:NEXT:RETUR
       N:BITMAP
CJ 1230 PRINT"SCREEN...":FORI=
       .TO999:PRINT#2,CHR$(PE
       EK(SC+I));:NEXT:RETURN
       :SCREEN
DG 1240 PRINT"COLOR...":FORI=.
       TO999:PRINT#2,CHR$(PEE
       K(CR+I));:NEXT:RETURN:
       COLOR
MK 1250 PRINT"BACKGROUND...":P
       RINT#2,CHR$(BG);:RETUR
       N:BACKGROUND
QS 1260 PRINT"{CLR}{WHT}
       {3 DOWN}{4 SPACES}INSE
       RT SOURCE DISK, HIT <R
       ETURN>{DOWN}"
BR 1270 PRINTSPC(12)"HIT '<' T
       O ABORT":RETURN
MP 1280 PRINT"{WHT}{2 DOWN} IN
       SERT DESTINATION DISK,
        HIT <RETURN>{DOWN}":G
       OTO1270
PP 1290 OPEN15,8,15:INPUT#15,E
       R,ER$,E1,E2:CLOSE15:IF
       ER=0THENRETURN
HG 1300 PRINT"{CLR}{2 DOWN}DIS
       K ERROR: "ER;ER$;E1;E2
       :FORI=0TO2000:NEXTI:GO
       TO70
CP 1310 OPEN15,8,15:CLOSE15:I=
       ST:RET
KD 1320 DATA32,253,174,32,212,
       225,162,,160,,169,,32,
       213,255,96
JH 1330 DATA162,,169,,189,,92,
       189,,93,189,,94,189,,9
       5,232,208,241,96
KR 1340 DATADOODLE,PAINT NOW!,
       PRINT SHOP,ART STUDIO
RQ 1350 DATAKOALA,CREATE WITH
       {SPACE}GARFIELD,ARTIST
```

```
        64,RAINBOW PAINTER
CE 1360 DATABLAZING PADDLES,AD
        V ART STUDIO,MICRO ILL
        USTRATOR
MQ 1370 GETA$:IFA$=""THEN1370
JG 1380 RETURN
```

Jericho II

See instructions in article on page 29 before typing in.

```
0801:0B 08 FF FF 9E 32 32 38 F2
0809:38 00 F8 08 FF FF 8F 22 16
0811:0D 0D 0D 0D 0D 0D 0D 0D 21
0819:0D 0D 0D 0D 0D 0D 0D 0D 29
0821:0D 0D 0D 0D 0D 0D 0D 0D 31
0829:20 20 20 20 20 20 20 20 39
0831:20 20 20 20 B0 C0 C0 C0 2A
0839:C0 C0 C0 C0 C0 C0 C0 C0 49
0841:C0 C0 C0 AE 0D 20 20 20 2E
0849:20 20 20 20 20 B0 C0 C0 7D
0851:C0 BD 43 4F 50 59 52 49 64
0859:47 48 54 20 31 39 38 39 C3
0861:AD C0 C0 C0 AE 0D 20 20 A6
0869:20 20 20 20 20 20 DD 43 18
0871:4F 4D 50 55 54 45 21 20 F5
0879:20 50 55 42 4C 49 43 41 CB
0881:54 49 4F 4E 53 DD 0D 20 29
0889:20 20 20 20 20 20 20 AD 27
0891:C0 C0 AE 33 32 34 20 20 FD
0899:57 2E 20 57 45 4E 44 4F 95
08A1:56 45 52 B0 C0 C0 BD 0D 15
08A9:20 20 20 20 20 20 20 20 B9
08B1:20 20 20 AD AE 47 52 45 35
08B9:45 4E 53 42 4F 52 4F 2C 1D
08C1:20 4E 43 B0 BD 0D 20 20 6B
08C9:20 20 20 20 20 20 20 20 D9
08D1:20 20 AD C0 C0 C0 C0 C0 07
08D9:C0 C0 C0 C0 C0 C0 C0 C0 E9
08E1:C0 BD 0D 0D 0D 0D 0D 0D F7
08E9:0D 0D 0D 0D 00 00 00 20 56
08F1:A9 0D 20 6D 0F 20 58 12 B0
08F9:20 12 12 20 35 12 20 B7 CC
0901:12 20 94 13 A5 C5 C9 40 FF
0909:F0 EE 20 A9 0D 20 6D 0F C0
0911:20 EE 0C 20 94 13 4C 11 0D
0919:09 C9 60 D0 02 A9 20 60 92
0921:AD 28 04 C9 E0 D0 0A AD 3D
0929:50 04 C9 20 D0 03 20 A5 18
0931:0C 60 00 00 00 00 00 00 61
0939:00 00 00 00 00 00 00 00 4B
0941:15 11 00 A4 99 00 A4 99 1C
0949:03 E7 95 00 E7 99 00 E7 17
0951:99 00 E7 99 00 E3 B8 00 C7
0959:C7 15 00 24 98 00 E7 90 FB
0961:00 E7 90 00 E7 95 00 E7 FC
0969:98 00 E7 90 00 E7 90 04 92
0971:E7 90 24 E7 95 E5 57 A8 3A
0979:EA A3 F0 FF C0 00 00 14 22
0981:14 14 90 91 92 90 91 92 5A
0989:97 97 96 93 91 9E 93 99 21
0991:9E 97 99 97 A3 BB A0 C5 98
0999:73 41 26 12 49 E4 9E 79 30
09A1:E7 9E 79 E5 4E 79 E6 1E 21
09A9:79 E4 9E 79 E7 9E 79 E7 B1
09B1:9E 79 E7 9E 79 E3 8E 3A 0B
09B9:C3 0C 3F 00 00 00 00 44 DC
09C1:51 04 66 49 66 66 49 66 A4
09C9:66 59 66 66 79 D6 9E 79 76
09D1:96 9E 59 A6 8E BB EE 5F 0D
09D9:7D F5 82 49 26 0E 79 E7 51
09E1:0E 79 E7 0E 55 E7 0E 69 07
09E9:E7 0E 79 E7 0E 79 E7 0E 55
09F1:79 E7 5E 79 E5 8E 38 EA E2
09F9:0C 30 FF 00 00 00 00 50 6E
0A01:50 00 42 40 00 42 40 00 13
0A09:4E 50 00 4E 40 00 46 40 0C
0A11:00 56 51 11 AE 88 88 5F FD
0A19:55 55 92 96 94 9F 97 94 CF
0A21:93 97 94 93 97 94 93 97 7E
0A29:94 93 97 94 93 97 94 93 60
0A31:97 94 53 55 55 82 AA A8 A8
0A39:0F FF F0 00 00 00 00 28 1B
0A41:00 28 AA 00 AA AA 82 AA 64
0A49:A6 82 A5 AA 82 AA 2A AE 72
0A51:A8 0A BA A0 02 AE 80 03 6C
0A59:BA C0 0F AE F0 1F BA F4 36
0A61:56 AE 94 55 FB 55 65 EF 24
0A69:59 55 79 55 55 2C 55 14 1E
0A71:38 14 10 2C 04 40 00 01 8D
0A79:00 00 00 00 00 00 00 00 8D
0A81:82 00 02 AA 80 02 EB 80 26
0A89:02 AA 80 02 AA 80 00 AA 7B
0A91:00 00 AA 00 00 28 00 00 9B
0A99:D7 00 00 D7 00 03 55 C0 8E
0AA1:01 55 40 01 55 40 01 D7 29
0AA9:40 01 14 40 03 00 C0 00 3E
0AB1:00 00 00 00 00 00 00 00 C5
0AB9:00 00 00 00 00 00 00 AD 7B
0AC1:3C 04 C9 E0 D0 0A AD 64 AA
0AC9:04 C9 20 D0 03 20 C2 0C 8D
0AD1:60 20 21 09 AD 28 04 20 09
0AD9:1A 09 8D 80 14 A9 04 85 CB
0AE1:FC A9 50 85 FB A0 00 8C 30
0AE9:7C 14 20 8A 0C EE 7C 14 17
0AF1:AD 7C 14 C9 17 90 F3 A9 A7
0AF9:14 A0 00 20 3F 0C A0 13 C0
0B01:A9 98 85 FB A9 07 85 FC F3
0B09:20 7E 0C CE 7C 14 D0 F8 0C
0B11:A9 01 A0 13 20 2A 0C AD F0
0B19:80 14 8D 29 04 60 20 21 BB
0B21:09 AD 28 04 20 1A 09 8D 75
0B29:80 14 A0 00 A9 14 20 54 CA
0B31:0C A9 50 85 FB A9 04 85 2E
0B39:FC A0 13 A9 00 8D 7C 14 36
0B41:20 8A 0C EE 7C 14 AD 7C 86
0B49:14 C9 17 90 F3 A0 13 A9 B9
0B51:01 20 69 0C A9 07 85 FC 4F
0B59:A9 98 85 FB A0 00 20 7E 9E
0B61:0C CE 7C 14 D0 F8 AD 80 48
0B69:14 8D 50 04 60 20 C0 0A 46
0B71:AD 3C 04 20 1A 09 8D 80 80
0B79:14 A9 04 85 FC A9 64 85 B9
0B81:FB A0 00 8C 7C 14 20 8A 85
0B89:0C EE 7C 14 AD 7C 14 C9 83
0B91:17 90 F3 A9 28 A0 14 20 7C
0B99:3F 0C A0 27 A9 98 85 FB 8F
0BA1:A9 07 85 FC 20 7E 0C CE B0
0BA9:7C 14 D0 F8 A9 15 A0 27 B6
0BB1:20 2A 0C AD 80 14 8D 3D 6B
0BB9:04 60 20 C0 0A AD 3C 04 7D
0BC1:20 1A 09 8D 80 14 A0 14 12
0BC9:A9 28 20 54 0C A9 64 85 5D
0BD1:FB A9 04 85 FC A0 13 A9 63
0BD9:00 8D 7C 14 20 8A 0C EE 56
0BE1:7C 14 AD 7C 14 C9 17 90 3F
0BE9:F3 A0 27 A9 15 20 69 0C A9
0BF1:A9 07 85 FC A9 98 85 FB D5
0BF9:A0 14 20 7E 0C CE 7C 14 F9
0C01:D0 F8 AD 80 14 8D 64 04 21
0C09:60 8D 81 14 A5 FB 38 ED A1
0C11:81 14 85 FB B0 02 C6 FC 77
0C19:60 8D 81 14 A5 FB 18 6D F0
0C21:81 14 85 FB 90 02 E6 FC C6
0C29:60 8D 81 14 88 B9 28 04 C5
0C31:20 1A 09 C8 99 28 04 88 8B
0C39:CC 81 14 D0 EF 60 8D 81 45
0C41:14 C8 B9 C0 07 20 1A 09 CE
0C49:88 99 C0 07 C8 CC 81 14 25
0C51:90 EF 60 8D 81 14 C8 B9 3A
0C59:28 04 20 1A 09 88 99 28 F1
0C61:04 C8 CC 81 14 D0 EF 60 83
0C69:8D 81 14 88 B9 C0 07 20 B2
0C71:1A 09 C8 99 C0 07 88 CC 8B
0C79:81 14 B0 EF 60 20 96 0C 29
0C81:20 1A 0C 20 9F 0C 4C 0A 83
0C89:0C 20 96 0C 20 0A 0C 20 A4
0C91:9F 0C 4C 1A 0C B1 FB 20 E6
0C99:1A 09 AA A9 28 60 8A 91 5A
0CA1:FB A9 50 60 A2 00 A9 E0 7B
0CA9:9D 28 04 9D CA 07 E8 E0 1A
0CB1:0A 90 F3 A9 20 9D 28 04 D7
0CB9:9D B6 07 E8 E0 14 90 F3 2A
0CC1:60 A2 00 A9 E0 9D 3C 04 47
0CC9:9D DE 07 E8 E0 0A 90 F3 1C
0CD1:A9 20 9D 3C 04 9D CA 07 71
0CD9:E8 E0 14 90 F3 60 A9 80 1F
0CE1:8D 0E D4 8D 0F D4 8D 12 B0
0CE9:D4 AD 1B D4 60 AD 00 DC 1F
0CF1:29 0F C9 0D D0 06 20 6E B9
0CF9:0B 4C 04 0D C9 0E D0 03 27
0D01:20 BB 0B AD 01 DC 29 0F 33
0D09:C9 0D D0 06 20 D2 0A 4C 72
0D11:1A 0D C9 0E D0 03 20 1F 87
0D19:0B 60 CA C5 D2 C9 C3 C8 94
0D21:CF A0 C9 C9 A0 E2 F9 A0 46
0D29:D2 EF E2 E5 F2 F4 A0 C2 D2
0D31:E9 F8 E2 F9 A0 A0 A0 A0 E3
0D39:A0 A0 B3 B0 B0 B6 A0 D3 C2
0D41:F4 EF EE E5 E3 F5 F4 F4 E3
0D49:E5 F2 A0 D4 E5 F2 F2 E1 37
0D51:E3 E5 A0 A0 A0 A0 A0 A0 5E
0D59:A0 A0 C7 F2 E5 E5 EE F3 AC
0D61:E2 EF F2 EF AC A0 CE EF BB
0D69:F2 F4 E8 A0 C3 E1 F2 EF DC
0D71:EC E9 EE E1 A0 B2 B7 B4 6C
0D79:B0 B5 C3 E8 F2 E9 F3 F4 7C
0D81:ED E1 F3 AC A0 B1 B9 B8 4C
0D89:B8 A0 A0 A0 A0 A0 A0 A0 AF
0D91:A0 A0 A0 A0 A0 A0 A0 A0 AB
0D99:A0 A0 EA 78 A9 EA 8D 15 3A
0DA1:03 A9 31 8D 14 03 58 60 64
0DA9:A2 00 A0 00 88 D0 FD CA 77
0DB1:D0 FA 60 A2 00 A0 00 8E 3A
0DB9:7E 14 A9 1D 8D D6 0D 8D 8E
0DC1:DC 0D A9 05 8D D7 0D A9 A2
0DC9:D9 8D DD 0D AD 89 14 8D 0A
0DD1:87 14 A9 A0 9D 00 00 AD 8E
0DD9:87 14 9D 00 00 E8 E0 0A DF
0DE1:90 F0 A2 00 AD D6 0D 18 CF
0DE9:69 28 8D D6 0D 8D DC 0D 47
0DF1:90 06 EE D7 0D EE DD 0D 1E
0DF9:C8 C0 0C 90 D5 60 A2 00 A8
0E01:A0 00 8E 7E 14 A9 31 8D 5E
0E09:D6 0D 8D DC 0D A9 05 8D F9
0E11:D7 0D A9 D9 8D DD 0D AD DA
0E19:88 14 8D 87 14 4C D3 0D 2F
0E21:00 00 A2 00 A0 00 8C 21 D0
0E29:0E 8C 22 0E A9 1D 8D 38 A9
0E31:0E A9 05 8D 39 0E BD 00 B5
0E39:00 C9 20 D0 06 20 03 0F 9E
0E41:4C 49 0E A9 01 8D 22 0E C2
0E49:E8 E0 0A 90 E9 A2 00 AD E3
0E51:38 0E 18 69 28 8D 38 0E 9C
0E59:90 03 EE 39 0E C8 C0 0C 11
0E61:90 D4 AD 22 0E F0 01 60 69
0E69:AD 21 0E F0 0D CE 88 14 3E
0E71:AD 88 14 C9 02 90 10 4C 64
0E79:FF 0D CE 89 14 AD 89 14 C9
0E81:C9 02 90 03 4C B4 0D 68 FC
0E89:68 20 9B 0D 58 A2 00 8E 02
0E91:18 D4 A9 E0 9D 20 05 9D 47
0E99:70 05 BD D2 0E 9D 48 05 90
0EA1:A9 01 9D 20 D9 9D 48 D9 38
0EA9:9D 70 D9 E8 E0 18 90 E2 E5
0EB1:A5 C5 C9 19 D0 03 4C F0 F8
0EB9:08 C9 27 D0 03 4C E2 FC 4A
0EC1:AD 00 DC 29 10 D0 E9 AD 28
0EC9:01 DC 29 10 D0 E2 4C F0 5F
0ED1:08 E0 20 20 10 0C 01 19 FB
0ED9:20 01 07 01 09 0E 3F 20 56
0EE1:20 3C 19 2F 0E 3E 20 20 FC
0EE9:E0 A2 00 A0 00 8C 22 0E AD
0EF1:A9 01 8D 21 0E A9 31 8D ED
0EF9:38 0E A9 05 8D 39 0E 4C F4
0F01:37 0E 8E 84 14 8C 85 14 4A
0F09:A2 0A AD 21 0E F0 1E AD E0
0F11:88 14 38 E9 07 49 FF 8D 09
0F19:86 14 8A 38 ED 86 14 AA B0
0F21:AD 86 14 18 69 30 8D 27 0A
0F29:04 A9 18 D0 1C AD 89 14 82
0F31:38 E9 07 49 FF 8D 86 14 B2
0F39:8A 38 ED 86 14 AA AD 86 FD
0F41:14 18 69 30 8D 00 04 A9 BD
0F49:04 8D 54 0F 8D 57 0F 8D BD
0F51:60 0F FE 00 04 BD 00 04 5E
0F59:C9 3A 90 09 A9 30 9D 00 D6
0F61:04 CA 4C 53 0F AE 84 14 43
0F69:AC 85 14 60 20 9B 0D A9 FA
0F71:00 8D 5F 14 8D 5D 14 8D B7
0F79:20 D0 8D 21 D0 A9 04 8D 62
```

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0F81:8E 14 A2 00 8E 15 D0 BD 68
0F89:21 14 C9 63 F0 07 9D 5C E7
0F91:14 E8 4C 88 0F A9 8E 20 62
0F99:D2 FF A9 08 20 D2 FF A9 CC
0FA1:06 8D 88 14 8D 89 14 A9 DC
0FA9:93 20 D2 FF A2 00 A9 30 8C
0FB1:9D 04 04 9D 18 04 E8 E0 7D
0FB9:0B 90 F5 8D 00 04 8D 27 6B
0FC1:04 A9 08 A0 00 99 00 D8 96
0FC9:99 00 D9 99 00 DA 99 00 28
0FD1:DB C8 D0 F1 20 A5 0C 20 19
0FD9:C2 0C 20 B4 0D 20 FF 0D A1
0FE1:78 A9 EE 8D 14 03 A9 0F 6C
0FE9:8D 15 03 58 60 8D 90 14 68
0FF1:8C 92 14 8E 91 14 AD 86 25
0FF9:14 C9 03 90 05 A9 03 8D 60
1001:8E 14 AD 8F 14 F0 03 4C D2
1009:8F 10 EE 8B 14 AD 8B 14 0E
1011:CD 8E 14 F0 03 4C 7A 10 9B
1019:A9 00 8D 8B 14 8D 8A 14 78
1021:20 5A 11 B1 19 C9 E0 F0 C7
1029:05 A9 20 20 70 11 20 9A DE
1031:11 20 5A 11 B1 19 C9 20 E3
1039:F0 0D C9 E0 F0 03 20 AE DE
1041:10 20 8B 11 20 9A 11 20 A1
1049:D9 11 20 5A 11 B1 19 C9 8F
1051:20 F0 0D C9 E0 F0 03 20 EC
1059:AE 10 20 7C 11 20 D9 11 6E
1061:20 5A 11 B1 19 C9 E0 F0 08
1069:05 A9 60 20 70 11 EE 8A B4
1071:14 AD 8A 14 CD 5D 14 90 36
1079:A7 EE 8C 14 AD 8C 14 29 EC
1081:03 C9 03 D0 09 20 23 0E 20
1089:20 EA 0E 20 4E 13 EE 60 35
1091:14 AD 60 14 29 08 F0 04 C3
1099:A9 29 D0 02 A9 2A 8D 5C 80
10A1:14 AD 90 14 AE 91 14 AC 1B
10A9:92 14 4C 31 EA A5 1A 8D 64
10B1:95 14 18 69 D4 85 1A B1 DD
10B9:19 29 0F 18 69 01 91 19 9F
10C1:CD 93 14 90 0E AD 00 D8 39
10C9:91 19 AD 95 14 85 1A A9 9C
10D1:20 91 19 EA A9 00 8D 7D 1E
10D9:14 A9 05 38 ED 86 14 8D D1
10E1:94 14 20 4C 11 A8 B9 96 4F
10E9:14 85 19 B9 AE 14 18 69 93
10F1:D4 85 1A 20 42 11 8D 95 2A
10F9:14 AE 8A 14 BD 70 14 C9 04
1101:14 90 09 AD 95 14 18 69 E3
1109:14 4C 10 11 AD 95 14 A8 EF
1111:B1 19 C9 08 F0 CC 29 0F 28
1119:18 69 01 91 19 CD 93 14 16
1121:90 10 AD 00 D8 91 19 A5 2A
1129:1A 38 E9 D4 85 1A A9 20 F8
1131:91 19 20 10 13 EE 7D 14 CA
1139:AD 7D 14 CD 94 14 90 A2 A9
1141:60 20 DF 0C 29 0F C9 05 76
1149:90 F7 60 20 DF 0C 29 1F 60
1151:C9 06 90 F7 C9 12 B0 F3 57
1159:60 AE 8A 14 BD 6C 14 A8 5A
1161:B9 96 14 85 19 B9 AE 14 02
1169:85 1A BD 70 14 A8 60 8D 25
1171:95 14 20 5A 11 AD 95 14 8B
1179:91 19 60 AE 8A 14 BD 74 36
1181:14 49 FF 9D 74 14 20 10 1E
1189:13 60 AE 8A 14 BD 78 14 68
1191:49 FF 9D 78 14 20 10 13 E7
1199:60 AE 8A 14 BD 78 14 F0 13
11A1:0E FE 6C 14 BD 6C 14 C9 EA
11A9:18 90 2C A9 01 D0 0C DE 5E
11B1:6C 14 BD 6C 14 C9 19 90 18
11B9:1E A9 17 9D 6C 14 BD 70 B1
11C1:14 C9 14 B0 09 18 69 14 7D
11C9:9D 70 14 4C D5 11 38 E9 6B
11D1:14 9D 70 14 4C 9A 11 60 04
11D9:AE 8A 14 BD 74 14 F0 18 42
11E1:FE 70 14 BD 70 14 C9 28 8D
11E9:90 26 20 7C 11 A9 25 AE D1
11F1:8A 14 9D 70 14 4C D9 11 AF
11F9:DE 70 14 BD 70 14 C9 28 95
1201:90 0E 20 7C 11 A9 01 AE 9C
1209:8A 14 9D 70 14 4C D9 11 C8
1211:60 AD 6A 14 F0 17 20 6E F1
1219:0B CE 67 14 D0 15 AD 6A 45
1221:14 49 FF 8D 6A 14 20 DF 3E
1229:0C 8D 67 14 60 20 BB 0B EA
1231:4C 1A 12 60 AD 69 14 F0 76
1239:17 20 D2 0A CE 68 14 D0 FC
1241:15 AD 69 14 49 FF 8D 69 98
1249:14 20 DF 0C 8D 68 14 60 D2
1251:20 1F 0B 4C 3D 12 60 A9 10
1259:0F 8D 15 D0 8D 1C D0 8D 24
1261:1D D0 8D 17 D0 A9 00 8D 26
1269:1B D0 A9 56 8D 00 D0 A9 A1
1271:86 8D 02 D0 A9 B6 8D 04 D0
1279:D0 A9 E6 8D 06 D0 A9 44 31
1281:8D 01 D0 8D 03 D0 8D 05 1B
1289:D0 8D 07 D0 AD 6B 14 8D 38
1291:26 D0 A9 0F 8D 25 D0 A9 6F
1299:00 8D 27 D0 8D 28 D0 8D 4F
12A1:29 D0 8D 2A D0 A0 00 B9 A5
12A9:C6 14 99 F8 07 C8 C0 04 D9
12B1:90 F5 EE 6B 14 60 EE 63 93
12B9:14 AD 63 14 C9 03 B0 01 BD
12C1:60 A9 00 8D 63 14 AC 61 7F
12C9:14 A2 00 B9 EC 14 9D 11 40
12D1:D8 E8 E0 05 90 F5 EE 61 A4
12D9:14 AD 61 14 C9 10 B0 01 D1
12E1:60 A9 00 8D 61 14 AD 62 92
12E9:14 18 69 05 8D 62 14 C9 83
12F1:1E 90 05 A9 00 8D 62 14 93
12F9:AC 62 14 A2 00 B9 CE 14 52
1301:29 3F 9D 11 04 E8 C8 E0 86
1309:05 90 F2 20 58 12 60 20 22
1311:DF 0C 29 07 AA BD 04 15 29
1319:8D 66 14 BD FC 14 8D 65 B6
1321:14 A9 08 8D 00 D4 8D 01 05
1329:D4 8D 07 D4 8D 08 D4 A9 2B
1331:0F 8D 18 D4 8D 05 D4 8D 4A
1339:0C D4 A9 FC 8D 06 D4 8D 5B
1341:0D D4 A9 10 8D 04 D4 A9 29
1349:15 8D 0B D4 60 EE 64 14 A7
1351:AD 64 14 C9 02 D0 06 A9 8F
1359:00 8D 64 14 60 AD 66 14 4B
1361:18 69 C8 8D 66 14 90 03 87
1369:EE 65 14 AE 65 14 AD 66 0B
1371:14 8D 00 D4 18 69 0A 8D 5A
1379:07 D4 8E 01 D4 90 01 E8 0E
1381:8E 08 D4 AD 65 14 C9 1E 93
1389:90 08 A9 10 8D 04 D4 8D E3
1391:0B D4 60 AD 00 04 18 6D 07
1399:27 04 4A 38 E9 2F C9 05 C5
13A1:90 02 A9 04 8D 5F 14 A2 BA
13A9:00 AD 15 D0 1D 10 15 8D CB
13B1:15 D0 E8 EC 5F 14 B0 03 32
13B9:4C AA 13 8E 5D 14 AD 5C EE
13C1:14 8D FC 07 8D FD 07 8D 65
13C9:FE 07 8D FF 07 A2 00 A0 46
13D1:00 BD 6C 14 0A 0A 0A 18 DA
13D9:69 32 99 09 D0 A9 00 8D BF
13E1:5E 14 BD 70 14 0A 2E 5E 7E
13E9:14 0A 2E 5E 14 0A 2E 5E CB
13F1:14 18 69 1A 90 03 EE 5E C3
13F9:14 99 08 D0 AD 5E 14 F0 9E
1401:0C AD 10 D0 1D 10 15 8D 8A
1409:10 D0 4C 18 14 EA AD 10 30
1411:D0 3D 0C 15 8D 10 D0 E8 FA
1419:C8 C8 EC 5F 14 90 B2 60 14
1421:00 00 00 00 00 00 00 00 49
1429:00 00 00 64 2F 00 FF 00 11
1431:0C 0C 03 03 04 24 24 04 EF
1439:00 FF FF 00 00 00 FF FF 61
1441:00 00 00 00 00 00 00 00 69
1449:00 00 00 00 06 06 00 00 B9
1451:00 00 04 00 00 00 00 09 03
1459:00 00 63 00 00 00 00 00 ED
1461:00 00 00 00 00 00 64 2F 81
1469:00 FF 00 0C 0C 03 03 04 C8
1471:24 24 04 00 FF FF 00 00 35
1479:00 FF FF 00 00 00 00 00 A1
1481:00 00 00 00 00 00 00 06 AF
1489:06 00 00 00 00 04 00 00 C4
1491:00 00 09 00 00 28 50 78 94
1499:A0 C8 F0 18 40 68 90 B8 61
14A1:E0 08 30 58 80 A8 D0 F8 09
14A9:20 48 70 98 C0 04 04 04 AD
14B1:04 04 04 05 05 05 05 05 F8
14B9:05 06 06 06 06 06 06 06 61
14C1:07 07 07 07 07 25 26 27 C0
14C9:28 29 2A 2B 2C 50 52 45 D4
14D1:53 53 20 41 4E 59 20 20 C8
14D9:4B 45 59 20 20 54 4F 20 37
14E1:20 42 45 47 49 4E 20 20 AB
14E9:20 20 20 00 06 05 07 03 83
14F1:01 01 01 01 01 03 07 05 32
14F9:06 00 00 02 02 02 02 03 64
1501:03 03 04 18 5A A3 CC 23 8D
1509:86 F4 30 EF DF BF 7F 10 C5
1511:20 40 80 00 00 00 00 00 6B
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BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Ramdisk

See instructions in article on page 38 before typing in.

```
0801:0D 08 C5 07 9E 32 30 36 17
0809:33 3A A2 00 00 00 A9 35 1E
0811:85 FB A9 08 85 FC A9 00 0C
0819:85 FD A9 C6 85 FE A0 00 76
0821:B1 FB 91 FD C8 D0 F9 E6 7F
0829:FC E6 FE A5 FE C9 CE D0 39
0831:EF 4C 00 C6 20 E7 C6 A9 90
0839:A2 A0 C6 20 DF C6 A9 15 20
0841:8D 08 03 A9 C6 8D 09 03 96
0849:60 A5 9D F0 4B A9 67 85 0B
0851:FB A9 C6 85 FC A0 01 B1 19
0859:FB F0 3D B1 FB F0 19 D1 0E
0861:7A D0 04 C8 4C 27 C6 C8 45
0869:B1 FB D0 FB C8 C8 C8 18 3E
0871:98 65 FB 85 FB 4C 21 C6 19
0879:84 02 88 20 73 00 88 D0 DC
0881:FA B1 7A D0 02 C6 7A A4 9C
0889:02 C8 B1 FB 8D 62 C6 C8 0F
0891:B1 FB 8D 63 C6 20 FF FF 18
0899:4C E4 A7 20 44 49 52 00 EB
08A1:B7 C6 20 44 45 4C 00 C0 A3
08A9:C6 20 52 94 00 BA C6 20 51
08B1:52 93 00 BD C6 20 41 50 35
08B9:50 80 00 C6 C6 20 45 52 12
08C1:41 53 45 00 C3 C6 20 4B B4
08C9:49 4C 4C 00 C9 C6 20 52 17
08D1:9B 00 CC C6 00 00 0D 52 22
08D9:41 4D 44 49 53 4B 20 41 44
08E1:43 54 49 56 41 54 45 44 61
08E9:2E 0D 00 4C AE CC 4C 37 91
08F1:CB 4C A6 CA 4C CD C9 4C F5
08F9:31 C7 4C CF C7 4C F8 C6 43
0901:4C 23 C9 A9 A8 85 FB A9 D2
0909:CD 85 FC 60 A9 8A A0 CD 8F
0911:4C DF C6 20 1E AB A9 0D 1C
0919:4C D2 FF A9 30 8D 9F CD 65
0921:A9 00 8D 89 CD 8D A8 CD 16
0929:8D A2 CD 60 A9 E4 8D 08 6E
0931:03 A9 A7 8D 09 03 A9 09 AD
0939:A0 C7 4C DF C6 0D 52 41 65
0941:4D 44 49 53 4B 20 44 49 16
0949:53 41 42 4C 45 44 2E 0D 07
0951:00 A9 7F 8D 0D DC A9 34 F9
0959:85 01 60 A9 37 85 01 A9 90
0961:81 8D 0D DC 60 A9 01 8D 40
0969:89 CD 20 AE C8 AD 9B CD A4
0971:F0 03 4C 02 C9 A9 83 A0 03
0979:C7 20 DF C6 20 E4 FF F0 65
0981:FB C9 59 F0 07 A9 A3 A0 05
0989:C7 4C DF C6 20 E7 C6 AD D6
0991:8A CD F0 1C A0 00 B9 8A 3F
0999:CD F0 0B 99 45 CD C8 C0 7D
09A1:10 F0 0D 4C 62 C7 A9 20 04
09A9:99 45 CD C8 C0 10 D0 F8 01
09B1:A9 93 A0 C7 4C DF C6 0D 8A
09B9:41 52 45 20 59 4F 55 20 7E
09C1:53 55 52 45 20 3F 00 91 01
09C9:52 41 4D 44 49 53 4B 20 91
09D1:45 52 41 53 45 44 00 91 45
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09D9:45 52 41 53 45 20 41 42 EF
09E1:4F 52 54 45 44 20 00 A0 52
09E9:00 B9 8A CD F0 14 C9 2A 2E
09F1:F0 07 C9 3F F0 03 4C CA 62
09F9:C7 A9 2D 99 8A CD C8 4C 03
0A01:B5 C7 60 20 AE C8 90 01 AA
0A09:60 A0 00 B1 2B D0 0D C8 10
0A11:B1 2B D0 08 20 F3 CB 90 5C
0A19:79 4C B1 CA A5 2B 85 FB C0
0A21:A5 2C 85 FC A0 00 B1 FB F7
0A29:85 FD C8 B1 FB 85 FE A0 48
0A31:00 B1 FD D0 05 C8 B1 FD 2B
0A39:F0 0B A5 FD 85 FB A5 FE 83
0A41:85 FC 4C F0 C7 A0 02 B1 66
0A49:FB 85 FD C8 B1 FB 85 FE 90
0A51:20 F3 CB 90 03 4C B1 CA 6C
0A59:A0 11 B1 FB 85 A8 A9 00 1A
0A61:85 A7 20 1D C7 A0 04 B1 72
0A69:A7 C5 FE F0 04 B0 23 D0 AB
0A71:09 88 B1 A7 C5 FD F0 02 E6
0A79:B0 18 20 27 C7 A9 50 A0 88
0A81:C8 4C DF C6 0D 41 50 50 D3
0A89:45 4E 44 20 45 52 52 4F C5
0A91:52 00 20 27 C7 A9 A2 A0 10
0A99:C8 20 1E AB A5 2B 8D 9C 2A
0AA1:CD A5 2C 8D 9D CD 38 A5 9E
0AA9:2D E9 03 85 2B A5 2E E9 BD
0AB1:00 85 2C A5 2B 85 A7 A5 6B
0AB9:2C 85 A8 A9 01 8D 9E CD 3E
0AC1:20 CA CA E6 2D D0 02 E6 F7
0AC9:2E AD 9C CD 85 2B AD 9D A2
0AD1:CD 85 2C 4C 33 A5 0D 41 04
0AD9:50 50 45 4E 44 49 4E 47 E2
0AE1:20 00 A2 00 8E 8A CD 8E 23
0AE9:9B CD A0 01 B1 7A F0 41 FD
0AF1:20 73 00 C9 22 D0 31 A0 E6
0AF9:01 B1 7A F0 1F C9 22 F0 AE
0B01:1B 9D 8A CD E8 E0 10 F0 16
0B09:13 C8 4C C5 C8 A9 00 9D 4B
0B11:8A CD AD 8A CD D0 03 4C 42
0B19:FD C8 18 60 A0 01 B1 7A 50
0B21:F0 EB 20 73 00 4C E8 C8 B1
0B29:EE 9B CD 4C E8 C8 20 E8 AF
0B31:C8 AD 89 CD D0 07 A9 10 2B
0B39:A0 C9 20 DF C6 A9 00 8D 7E
0B41:89 CD 38 60 0D 49 4E 56 1D
0B49:41 4C 49 44 20 50 41 52 97
0B51:41 4D 45 54 45 52 00 20 DC
0B59:AE C8 90 01 60 20 F3 CB 52
0B61:90 03 4C B1 CA A0 10 B1 CF
0B69:FB 8D A3 CD A0 11 B1 FB DA
0B71:85 FC A9 00 85 FB 20 B4 CF
0B79:C9 20 B4 C9 20 D7 AA 20 85
0B81:B4 C9 AA 20 B4 C9 20 CD 96
0B89:BD 20 3F AB AD A3 CD F0 B1
0B91:54 20 B4 C9 F0 35 85 02 76
0B99:C9 22 D0 08 AD CC C9 49 35
0BA1:01 8D CC C9 A5 02 C9 4C E6
0BA9:90 19 AE CC C9 D0 14 A2 4D
0BB1:B9 8E 00 03 A0 FF A5 02 CA
0BB9:20 17 A7 A9 8B 8D 00 03 CA
0BC1:4C 58 C9 A5 02 20 D2 FF DD
0BC9:4C 58 C9 AD 8D 02 C9 02 3A
0BD1:F0 13 C9 01 F0 F5 A9 00 21
0BD9:8D CC C9 20 B4 C9 D0 99 2D
0BE1:20 B4 C9 D0 97 4C E2 C6 F5
0BE9:20 1D C7 E6 FB D0 05 E6 D2
0BF1:FC CE A3 CD A0 00 B1 FB EF
0BF9:85 02 20 27 C7 A5 02 60 03
0C01:00 A9 00 8D A5 CD 20 AE AF
0C09:C8 90 01 60 20 F3 CB 90 C8
0C11:12 4C 83 CA AD A6 CD 85 8B
0C19:FB AD A7 CD 85 FC 20 F6 C3
0C21:CB B0 EE 20 71 CD 85 FF F8
0C29:18 A0 10 B1 FB 8D A4 CD BF
0C31:6D 9F CD 8D 9F CD A0 11 01
0C39:B1 FB 85 A8 A9 00 85 A7 64
0C41:18 A5 A8 6D A4 CD C5 FF A2
0C49:F0 25 A0 10 B1 FB 18 65 4B
0C51:A8 85 FE A9 00 85 FD A8 54
0C59:20 1D C7 B1 FD 91 A7 C8 2B
0C61:D0 F9 E6 FE E6 A8 A5 FE 51
0C69:C5 FF D0 EF 20 27 C7 EE 99
0C71:A5 CD A5 FB 85 FD 8D A6 2A
0C79:CD A5 FC 85 FE 8D A7 CD 25
0C81:20 7B CD A0 13 B1 FB 91 35
0C89:FD 88 C0 FF D0 F7 A0 00 82
0C91:B1 FD F0 1D A0 11 38 B1 5D
0C99:FD ED A4 CD 91 FD 20 7B DD
0CA1:CD 18 A5 FD 69 14 85 FD DF
0CA9:A5 FE 69 00 85 FE 4C 4F 91
0CB1:CA CE A2 CD 4C E0 C9 20 AD
0CB9:E2 C6 AE A5 CD A9 00 20 5A
0CC1:CD BD A9 95 A0 CA 4C DF 67
0CC9:C6 20 46 49 4C 45 28 53 C5
0CD1:29 20 44 45 4C 45 54 45 C8
0CD9:44 00 20 AE C8 90 01 60 ED
0CE1:20 F3 CB 90 07 A9 26 A0 55
0CE9:CB 4C DF C6 A5 2C 85 A8 F4
0CF1:A9 00 85 A7 8D 9E CD A9 36
0CF9:1C A0 CB 20 1E AB A0 11 B5
0D01:B1 FB 85 FE A9 00 85 FD E9
0D09:20 D8 C6 20 1D C7 A0 13 A0
0D11:B1 FB F0 11 AA A0 00 B1 BB
0D19:FD 91 A7 C8 D0 F9 E6 FE 53
0D21:E6 A8 CA D0 F2 A0 12 B1 2F
0D29:FB A8 AA B1 FD 91 A7 88 E9
0D31:C0 FF D0 F7 A0 12 18 B1 74
0D39:FB 65 2B 85 2D C8 B1 FB 54
0D41:65 2C 85 2E 20 27 C7 AD 87
0D49:9E CD F0 01 60 4C 33 A5 94
0D51:0D 4C 4F 41 44 49 4E 47 2E
0D59:20 00 0D 46 49 4C 45 20 AF
0D61:4E 4F 54 20 46 4F 55 4E 6B
0D69:44 21 00 20 AE C8 90 01 AA
0D71:60 38 A5 2E E5 2C A8 C8 5B
0D79:CC 9F CD 90 0A F0 08 A9 72
0D81:E0 A0 CB 4C DF C6 60 A5 F2
0D89:2E C5 2C D0 0D A5 2D C9 E1
0D91:03 D0 07 A9 CB A0 CB 4C A1
0D99:DF C6 AD A2 CD C9 1E D0 D7
0DA1:07 A9 BB A0 CB 4C DF C6 41
0DA9:20 B3 C7 20 2F CC 90 01 8A
0DB1:60 A9 B2 A0 CB 20 1E AB 8D
0DB9:20 D8 C6 A0 11 B1 FB 85 C9
0DC1:A8 A9 00 85 A7 85 FD A5 E7
0DC9:2C 85 FE A0 10 B1 FB AA 2F
0DD1:A0 00 20 1D C7 B1 FD 91 A4
0DD9:A7 C8 D0 F9 E6 A8 E6 FE 5A
0DE1:CA D0 F2 4C 27 C7 0D 53 7E
0DE9:41 56 49 4E 47 20 00 0D 10
0DF1:44 49 52 45 43 54 4F 52 7B
0DF9:59 20 46 55 4C 4C 00 0D 87
0E01:4E 4F 20 50 52 4F 47 52 D1
0E09:41 4D 20 54 4F 20 53 41 45
0E11:56 45 21 00 0D 4F 55 54 72
0E19:20 4F 46 20 44 49 53 4B 1D
0E21:20 53 50 41 43 45 00 20 8F
0E29:CF C6 A0 00 B1 FB F0 31 83
0E31:B1 FB F0 18 D9 8A CD D0 2A
0E39:1B B9 8A CD F0 1D C8 B9 C6
0E41:8A CD C9 2A F0 04 C0 10 1B
0E49:D0 E6 18 60 B9 8A CD F0 15
0E51:F9 4C 27 CC B9 8A CD C9 8C
0E59:3F F0 E3 20 7B CD 4C F6 72
0E61:CB 38 60 20 F3 CB B0 09 B8
0E69:A9 99 A0 CC 20 DF C6 38 E7
0E71:60 20 CF C6 A0 00 B1 FB 90
0E79:F0 06 20 7B CD 4C 42 CC 3C
0E81:B9 8A CD 91 FB C8 C0 10 84
0E89:D0 F6 A5 FB 8D 97 CC A5 4A
0E91:FC 8D 98 CC 38 A5 2E E5 0A
0E99:2C A8 C8 98 A0 10 91 FB FC
0EA1:A0 11 20 71 CD 91 FB C8 E2
0EA9:38 A5 2D E5 2B 91 FB A5 8C
0EB1:2E E5 2C C8 91 FB C8 A9 28
0EB9:00 91 FB 38 A0 10 AD 9F 7D
0EC1:CD F1 FB 8D 9F CD EE A2 4E
0EC9:CD 18 60 00 00 0D 46 49 E8
0ED1:4C 45 20 41 4C 52 45 41 F4
0ED9:44 59 20 45 58 49 53 54 A9
0EE1:53 00 A9 01 8D 89 CD 20 3B
0EE9:AE C8 90 08 AD 9B CD F0 8A
0EF1:03 4C 02 C9 A0 00 B9 40 38
0EF9:CD F0 07 20 D2 FF C8 4C 90
0F01:C2 CC 20 CF C6 A0 00 B1 1F
0F09:FB F0 59 AD 8A CD F0 05 D9
0F11:20 F6 CB B0 4F A0 10 B1 50
0F19:FB AA A9 00 20 CD BD 38 01
0F21:20 F0 FF A9 20 20 D2 FF 4D
0F29:C8 C0 05 D0 F8 A9 22 20 5C
0F31:D2 FF A0 00 A2 11 B1 FB 85
0F39:F0 09 20 D2 FF C8 CA C0 BC
0F41:10 D0 F3 A9 22 20 D2 FF EB
0F49:A9 20 20 D2 FF CA D0 FA 3D
0F51:A9 6C A0 CD 20 DF C6 AD 0C
0F59:8D 02 C9 01 F0 F9 20 7B 33
0F61:CD 4C D1 CC AE 9F CD A9 B9
0F69:00 20 CD BD A9 5E A0 CD FA
0F71:20 DF C6 60 0D 30 20 12 F1
0F79:22 52 41 4D 44 49 53 4B 73
0F81:20 20 20 20 20 20 20 20 9F
0F89:20 22 20 30 30 20 32 41 EE
0F91:0D 00 20 42 4C 4F 43 4B CF
0F99:53 20 46 52 45 45 2E 00 F2
0FA1:50 52 47 00 00 38 A9 30 C9
0FA9:ED 9F CD 18 69 D0 60 18 49
0FB1:A5 FB 69 14 85 FB A5 FC 74
0FB9:69 00 85 FC 60 00 20 20 70
0FC1:20 20 20 20 20 20 20 20 DF
0FC9:20 20 20 20 20 20 00 00 87
0FD1:00 00 00 00 00 00 00 00 EF
0FD9:00 00 00 00 00 00 00 00 F7
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

Match Mania

Article on page 31.

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
      ALL RIGHTS RESERVED
DC 20 PRINT CHR$(15) CHR$(8)
QH 30 DIM LN$(6),D$(16),IN$(2)
      ,P(2,4)
JR 40 SKIP=0:WN$="":WIN$=""
EC 50 BL$="{39 SPACES}"
GA 60 POKE 53280,0:POKE 53281,
      0:PRINT"{CLR}"TAB(13)"
      {YEL}MATCH MANIA{DOWN}"
DX 70 PRINTTAB(12)"{7}COPYRIGH
      T 1989"
RS 80 PRINTTAB(6)"COMPUTE! PUB
      LICATIONS, INC."
XH 90 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED"
AR 100 L=7:GOSUB1920:PRINT TAB
      (2)"{5}NUMBER OF PLAYER
      S? (1-2):{2 SPACES}
      {LEFT}";:VQ=1:GOSUB1930
FS 110 PN=VAL(X$)
SM 120 IF PN<1 OR PN>2 THEN100
MC 130 L=9:GOSUB1920:PRINT TAB
      (2)"NAME OF PLAYER 1: "
      ;:VQ=7:GOSUB1930
PH 140 P1$=X$
FG 150 L=11:GOSUB1920
PQ 160 IF PN=2 THEN PRINT TAB(
      2) "NAME OF PLAYER 2: "
      ;:GOSUB1930:P2$=X$
SH 170 L=13:GOSUB1920:PRINT TA
      B(2) "CHARACTERS PER LI
      NE? (1-16):{3 SPACES}
      {2 LEFT}";:VQ=2
GF 180 GOSUB1930
BP 190 IF VAL(X$)<1 OR VAL(X$)
      >16 THEN170
CC 200 LM=VAL(X$)
KG 210 L=15:GOSUB1920:PRINT TA
      B(2) "LINES PER BOX? (1
      -6):{2 SPACES}{LEFT}";:
      VQ=1:GOSUB1930
JG 220 IF VAL(X$)<1 OR VAL(X$)
      >6 THEN210
```

```
PE 230 LN=VAL(X$)
HS 240 IF PN=1 THEN360
CB 250 L=17:GOSUB1920:PRINT TA
       B(2) "WINNER BY TIME OR
        %CORRECT? (T/C):
       {2 SPACES}{LEFT}";
DP 260 VQ=1:GOSUB1930
JE 270 IF X$<>"T" AND X$<>"C"
       {SPACE}THEN250
JP 280 WN$=X$
KR 290 IF WN$="C" THEN360
PD 300 L=19:GOSUB1920:PRINT TA
       B(2) "{GRN}OPTION: ADD
       {SPACE}45 SECS TO A PLA
       YER'S"
QQ 310 PRINT TAB(10) "TIME FOR
        EACH WRONG GUESS?"
RH 320 PRINT TAB(8) "(HELPS PR
       EVENT RANDOM GUESSING)"
DE 330 L=23:GOSUB1920:PRINT TA
       B(2) "{DOWN}INCLUDE THI
       S OPTION? (Y/N):
       {2 SPACES}{LEFT}";
EQ 340 VQ=1:GOSUB1930
GM 350 OP$=X$:IF OP$<>"Y" AND
       {SPACE}OP$<>"N" THEN330
PR 360 PL$=P1$:PL=1
QR 370 READ M2
KX 380 FOR M1=1 TO M2
BG 390 POKE 53280,0:POKE 53281
       ,0:PRINT"{CLR}"
AE 400 S1$="{20 RIGHT}
DK 410 S2$="{RIGHT}{H}
       {16 RIGHT}{N}"
MX 420 S3$="{RIGHT}O{16 Y}P"
FK 430 S4$="{RIGHT}L{16 P}@"
EM 440 L1$=S3$:L2$=S2$:L3$=S2$
       :L4$=S2$:L5$=S2$:L6$=S2
       $:L7$=S2$:L8$=S4$
DJ 450 R1$=S1$+S3$:R2$=S1$+S2$
       :R3$=S1$+S2$:R4$=S1$+S2
       $:R5$=S1$+S2$:R6$=S1$+S
       2$
EF 460 R7$=S1$+S2$:R8$=S1$+S4$
DA 470 LB$=L1$+CHR$(13)+L2$+CH
       R$(13)+L3$+CHR$(13)+L4$
       +CHR$(13)+L5$+CHR$(13)
BR 480 LB$=LB$+L6$+CHR$(13)+L7
       $+CHR$(13)+L8$
PC 490 RB$=R1$+CHR$(13)+R2$+CH
       R$(13)+R3$+CHR$(13)+R4$
       +CHR$(13)+R5$+CHR$(13)
SD 500 RB$=RB$+R6$+CHR$(13)
QR 510 RC$=R7$+CHR$(13)+R8$
PM 520 PRINT "{7}":GOSUB610
EM 530 PRINT "{5}":GOSUB620
KS 540 PRINT "{7}":GOSUB630
CS 550 PRINT "{5}":GOSUB640
ED 560 PRINT "{7}":GOSUB650
DC 570 PRINT "{5}":GOSUB660
GH 580 PRINT "{7}":GOSUB670
RG 590 PRINT "{5}":GOSUB680
JR 600 GOTO690
DH 610 L=3:GOSUB1920:PRINT LB$
       :RETURN
KE 620 L=11:GOSUB1920:PRINT TA
       B(8) "(1)":RETURN
PJ 630 L=3:GOSUB1920:PRINT RB$
        RC$:RETURN
CG 640 L=11:GOSUB1920:PRINT TA
       B(28) "(2)":RETURN
FB 650 L=14:GOSUB1920:PRINT LB
       $:RETURN
HR 660 L=22:GOSUB1920:PRINT TA
       B(8) "(3)":RETURN
MD 670 L=14:GOSUB1920:PRINT RB
       $ RC$:RETURN
AS 680 L=22:GOSUB1920:PRINT TA
       B(28) "(4)":RETURN
RG 690 PRINT "{HOME}{5}{RIGHT}
       "PL$", GET SET..."
PD 700 IF SKIP=0 THEN READ DT$
SS 710 FOR I=1 TO LEN(DT$)
MM 720 D$(I)=MID$(DT$,I,1)
BD 730 NEXT I
AG 740 FOR I=1 TO 6
XX 750 LN$(I)=""
RG 760 NEXT I
FJ 770 FOR I=1 TO LN
DJ 780 FOR J=1 TO LM
JQ 790 R1=INT(RND(0)*LEN(DT$))
       +1
CS 800 LN$(I)=LN$(I)+D$(R1)
QK 810 NEXT J
JK 820 NEXT I
RS 830 R1=INT(RND(0)*LEN(DT$))
       +1
SK 840 R2=INT(RND(0)*LEN(DT$))
       +1
EF 850 IF R2=R1 THEN840
PH 860 R3=INT(RND(0)*LN)+1
QR 870 RS=INT(RND(0)*LM)+1
FE 880 FLAG=0
BK 890 FOR J=RS TO LM
EP 900 IF MID$(LN$(R3),J,1)<>D
       $(R1) THEN970
HC 910 LR$(1)=MID$(LN$(R3),1,J
       -1)+D$(R2)+MID$(LN$(R3)
       ,J+1)
SF 920 IN$(1)="{CYN}"+MID$(LN$
       (R3),1,J-1)+"{RED}"+D$(
       R2)+"{CYN}"+MID$(LN$(R3
       ),J+1)
SH 930 IN$(2)="{CYN}"+MID$(LN$
       (R3),1,J-1)+"{RED}"+MID
       $(LN$(R3),J,1)+"{CYN}"+
       MID$(LN$(R3),J+1)
HJ 940 FLAG=1
FS 950 CN=J
MD 960 J=LM
AD 970 NEXT J
RF 980 IF FLAG=0 THEN830
CS 990 R4=INT(RND(0)*4)+1
HC 1000 FOR I=1 TO LN
CR 1010 B$(I)=LN$(I)
AP 1020 NEXT I
RF 1030 GOSUB1220
HS 1040 IF R4=1 THEN B$(R3)=LR
        $(1)
MK 1050 GOSUB1160
SG 1060 GOSUB1230
JM 1070 IF R4=2 THEN B$(R3)=LR
        $(1)
DP 1080 GOSUB1160
DP 1090 GOSUB1240
QF 1100 IF R4=3 THEN B$(R3)=LR
        $(1)
QM 1110 GOSUB1160
JR 1120 GOSUB1250
XG 1130 IF R4=4 THEN B$(R3)=LR
        $(1)
FQ 1140 GOSUB1160
GM 1150 GOTO1260
PK 1160 FOR I=1 TO LN
FH 1170 ST$=ST$+"{DOWN}"
RC 1180 PRINT "{CYN}" ST$ B$(I
        )
AH 1190 NEXT I
HP 1200 B$(R3)=LN$(R3)
JM 1210 RETURN
FR 1220 ST$="{HOME}{2 DOWN}
        {2 RIGHT}":RETURN
FJ 1230 ST$="{HOME}{2 DOWN}
        {22 RIGHT}":RETURN
QF 1240 ST$="{HOME}{13 DOWN}
        {2 RIGHT}":RETURN
GJ 1250 ST$="{HOME}{13 DOWN}
        {22 RIGHT}":RETURN
SG 1260 GS=0
AS 1270 L=1:GOSUB1920:PRINT BL
        $
DP 1280 PRINT"{HOME}{RIGHT}{5}
        "PL$", WHICH PATTERN I
        S DIFFERENT?"
GH 1290 POKE 53280,0:POKE 5328
        1,0
FJ 1300 TI$="000000"
PB 1310 L=24:GOSUB1920:PRINT B
        L$
JM 1320 L=24:GOSUB1920:PRINT "
        {5} SELECT THE NUMBER
        {SHIFT-SPACE}(1-4):
        {2 SPACES}{LEFT}{5}";:
        VQ=1
EP 1330 GOSUB2440
BD 1340 G=VAL(X$)
HQ 1350 IF G>0 AND G<=4 THEN13
        90
SB 1360 IF X$<>"0" THEN1310
CK 1370 IF PL=1 THEN2070
FF 1380 L=23:GOSUB1920:PRINT T
        AB(6)"{RED}CAN'T END G
        AME BETWEEN TURNS!":GO
        TO1310
KE 1390 GS=GS+1
JM 1400 L=23:GOSUB1920:PRINT B
        L$
FJ 1410 L=24:GOSUB1920:PRINT B
        L$
EM 1420 L=24:GOSUB1920
MH 1430 IF G<>R4 THEN PRINT "
        {RED} SORRY,"G"IS INCO
        RRECT.{2 SPACES}TRY AG
        AIN: {5}";:GOTO1330
PG 1440 IF G=R4 THEN TM=VAL(TI
        $)
DH 1450 IF G=R4 THEN PRINT "
        {BLU} CORRECT!
        {2 SPACES}LINE"R3"CHAR
        "CN"IS DIFFERENT."
QR 1460 B$(R3)=IN$(1)
FC 1470 IF R4=1 THEN GOSUB1220
        :GOSUB1600:GOTO1510
JA 1480 IF R4=2 THEN GOSUB1230
        :GOSUB1600:GOTO1510
QX 1490 IF R4=3 THEN GOSUB1240
        :GOSUB1600:GOTO1510
CQ 1500 IF R4=4 THEN GOSUB1250
        :GOSUB1600
JA 1510 B$(R3)=IN$(2)
AG 1520 IF R4=1 THEN GOSUB1230
        :GOSUB1600:GOSUB1240:G
        OSUB1600
HS 1530 IF R4=1 THEN GOSUB1250
        :GOSUB1600:GOTO1650
CH 1540 IF R4=2 THEN GOSUB1220
        :GOSUB1600:GOSUB1240:G
        OSUB1600
DQ 1550 IF R4=2 THEN GOSUB1250
        :GOSUB1600:GOTO1650
JH 1560 IF R4=3 THEN GOSUB1220
        :GOSUB1600:GOSUB1230:G
        OSUB1600
XM 1570 IF R4=3 THEN GOSUB1250
        :GOSUB1600:GOTO1650
QF 1580 IF R4=4 THEN GOSUB1220
        :GOSUB1600:GOSUB1230:G
        OSUB1600
BP 1590 IF R4=4 THEN GOSUB1240
        :GOSUB1600:GOTO1650
QB 1600 FOR I=1 TO R3
DA 1610 ST$=ST$+"{DOWN}"
HB 1620 NEXT I
QK 1630 PRINT "{CYN}" ST$ B$(R
        3)
RG 1640 RETURN
AD 1650 IF R4<>1 THEN1670
QF 1660 FOR I=1 TO 9:PRINT "
        {CYN}";:GOSUB610:GOSUB
        1740:PRINT "{GRN}";:GO
        SUB610:NEXT I
KH 1670 IF R4<>2 THEN1690
QJ 1680 FOR I=1 TO 9:PRINT "
        {CYN}";:GOSUB630:GOSUB
        1740:PRINT "{GRN}";:GO
        SUB630:NEXT I
AQ 1690 IF R4<>3 THEN1710
```

```
HR 1700 FOR I=1 TO 9:PRINT "
        {CYN}";:GOSUB650:GOSUB
        1740:PRINT "{GRN}";:GO
        SUB650:NEXT I
AH 1710 IF R4<>4 THEN1750
GA 1720 FOR I=1 TO 9:PRINT "
        {CYN}";:GOSUB670:GOSUB
        1740:PRINT "{GRN}";:GO
        SUB670:NEXT I
JD 1730 GOTO1750
GM 1740 FOR J=1 TO 10:NEXT J:R
        ETURN
CQ 1750 L=1:GOSUB1920:PRINT BL
        $
JE 1760 IF GS=1 THEN PRINT "
        {HOME}{BLU} 1 GUESS...
         EXCELLENT!"
FH 1770 IF GS>1 THEN PRINT "
        {HOME}{BLU}"GS" {LEFT}
        GUESSES."
JS 1780 IF OP$="Y" AND GS>1 TH
        EN PRINT "{HOME}"TAB(2
        3)"{2}*"
SF 1790 IF OP$="Y" THEN TM=TM+
        45*(GS-1)
CC 1800 PRINT "{HOME}"TAB(24)"
        {RED}TIME:"TM"SEC"
AG 1810 P(PL,1)=P(PL,1)+TM
GX 1820 P(PL,2)=P(PL,2)+1
GM 1830 P(PL,3)=P(PL,3)+GS
MJ 1840 FOR I=1 TO 2000:NEXT I
HK 1850 IF PN=2 AND PL=1 THEN
        {SPACE}PL=2:PL$=P2$:SK
        IP=1:M1=M1-1:GOTO1870
PC 1860 IF PL=2 THEN PL=1:PL$=
        P1$:SKIP=0
KA 1870 NEXT M1
MG 1880 RESTORE
HG 1890 GOTO370
EC 1900 DATA 11
FA 1910 DATA "QW","{W}{Q}","AS
        ","OPL@","{V}{C}","IU"
        ,"{-}{+}","{B}Z","{E}
        {R}","AE","V+"
QC 1920 PRINT LEFT$("{HOME}
        {24 DOWN}",L);:RETURN
GH 1930 X$="":XX$="
GX 1940 GETX$
GC 1950 IFX$<>CHR$(13)THENPRIN
        T"{@}";CHR$(157);" ";C
        HR$(157);
FA 1960 IFX$=""THEN1940
GE 1970 IFX$=CHR$(13)ANDXX$=""
         THEN1940
GA 1980 IFX$=CHR$(13)THENX$=XX
        $:PRINTCHR$(13);:RETUR
        N
SS 1990 IF(ASC(X$)=20)AND(LEN(
        XX$)=0)THENGOSUB2050:G
        OTO1940
GK 2000 IFASC(X$)=20THENXX$=LE
        FT$(XX$,LEN(XX$)-1):PR
        INTX$;" ";X$;:GOTO1940
QK 2010 IFLEN(XX$)>=VQTHENGOSU
        B2050:GOTO1940
ES 2020 IF ASC(X$)=32 OR (ASC(
        X$)<58 AND ASC(X$)>47)
         THEN2040
RJ 2030 IFASC(X$)<64 OR ASC(X$
        )>90THENGOSUB2050:GOTO
        1940
KX 2040 XX$=XX$+X$:PRINTX$;:GO
        TO1940
DB 2050 POKE54278,240:POKE5427
        6,17:POKE54272,240:POK
        E54273,50:POKE54277,9
MK 2060 POKE54276,32:RETURN
FD 2070 IF P(1,2)=0 THEN2170
XE 2080 P(1,4)=100-ABS(INT((P(
        1,3)-P(1,2))/P(1,3)*10
        0))
QK 2090 IF PN=1 THEN2170
DM 2100 P(2,4)=100-ABS(INT((P(
        2,3)-P(2,2))/P(2,3)*10
        0))
HP 2110 IF WN$="C" THEN2150
AH 2120 IF P(1,1)<P(2,1) THEN
        {SPACE}WIN$=P1$:GOTO21
        80
QQ 2130 IF P(1,1)>P(2,1) THEN
        {SPACE}WIN$=P2$:GOTO21
        80
GX 2140 WIN$="TIE":GOTO2180
KK 2150 IF P(1,4)>P(2,4) THEN
        {SPACE}WIN$=P1$:GOTO21
        80
JM 2160 IF P(1,4)<P(2,4) THEN
        {SPACE}WIN$=P2$:GOTO21
        80
GQ 2170 WIN$="TIE":IF PN=1 THE
        N WIN$=P1$
KS 2180 FOR I=1 TO 2:FOR J=1 T
        O 4
BM 2190 P$(I,J)=MID$(STR$(P(I,
        J)),2)
SF 2200 NEXT J:NEXT I
RJ 2210 PRINT "{CLR}"TAB(8)"
        {BLU}MATCH MANIA GAME
        {SPACE}RESULTS"
PD 2220 PRINT "{DOWN}{7}PLAYER
        {2 SPACES}TOTAL
        {3 SPACES}#GUESS
        {3 SPACES}%CORRECT
        {2 SPACES}TIME"
BB 2230 L=4:GOSUB1920:PRINT "
        {BLU}{6 T}{2 SPACES}
        {5 T}{3 SPACES}{6 T}
        {3 SPACES}{8 T}
        {2 SPACES}{4 T}"
DK 2240 L=7:GOSUB1920
BR 2250 PRINT"{2}";
MF 2260 IF WIN$=P1$ OR WIN$="T
        IE" THEN PRINT"{RVS}";
JS 2270 PRINT P1$ "{OFF}" TAB(
        9) P$(1,2) TAB(18) P$(
        1,3);
QQ 2280 IF WIN$=P2$ OR PN=1 TH
        EN2310
RS 2290 IF WN$="C" THEN PRINT
        {SPACE}TAB(28) "{RVS}"
         P$(1,4)"%{OFF}" TAB(3
        6) P$(1,1):GOTO2330
RR 2300 PRINT TAB(28)P$(1,4)"%
        " TAB(36) "{RVS}" P$(1
        ,1) "{OFF}":GOTO2330
CK 2310 PRINT TAB(28)P$(1,4)"%
        " TAB(36) P$(1,1)
EX 2320 IF PN=1 THEN2390
GB 2330 IF WIN$=P2$ OR WIN$="T
        IE" THEN PRINT"{RVS}";
CB 2340 PRINT P2$ "{OFF}" TAB(
        9) P$(2,2) TAB(18) P$(
        2,3);
FJ 2350 IF WIN$=P1$ THEN2380
JQ 2360 IF WN$="C" THEN PRINT
        {SPACE}TAB(28) "{RVS}"
         P$(2,4)"%{OFF}" TAB(3
        6) P$(2,1):GOTO2390
QD 2370 PRINT TAB(28)P$(2,4)"%
        " TAB(36) "{RVS}" P$(2
        ,1) "{OFF}":GOTO2390
SH 2380 PRINT TAB(28)P$(2,4)"%
        " TAB(36) P$(2,1)
DG 2390 L=12:GOSUB1920
KR 2400 IF WIN$="TIE" THEN PRI
        NT TAB(4) "{RED}WINNER
         {CYN}(TIE){RED}: "P1$
        " & " P2$:GOTO2420
SD 2410 PRINT TAB(12) "{RED}WI
        NNER: "WIN$
PP 2420 L=21:GOSUB1920:PRINT"
        {BLU}"
MG 2430 END
AC 2440 GETX$:IF X$="" THEN244
        0
QP 2450 RETURN
```

Hi-Res 80 for the 128

See instructions in article on page 40 before typing in.

Program 1: HI-RES 80

```
1300:8D 97 14 8E 98 14 8C 99 06
1308:14 AD 97 14 F0 03 20 89 35
1310:13 A2 19 A9 87 20 B8 13 67
1318:A9 20 85 FE A9 00 85 FD 12
1320:A9 00 A2 12 20 B8 13 AD 48
1328:98 14 A2 13 20 B8 13 A9 D8
1330:00 8D 91 14 A9 19 8D 95 8F
1338:14 A9 07 8D 94 14 A9 27 FB
1340:8D 96 14 A2 00 A1 FD 20 22
1348:59 14 20 D0 13 CE 96 14 46
1350:D0 F1 AD 91 14 D0 1A A2 E4
1358:00 A1 FD 20 59 14 20 DC E0
1360:13 20 E0 13 CE 94 14 D0 27
1368:D5 A9 01 8D 91 14 4C 3E 90
1370:13 A9 00 8D 91 14 A2 00 85
1378:A1 FD 20 59 14 20 DC 13 76
1380:20 EE 13 CE 95 14 D0 B1 12
1388:60 A9 00 8D 92 14 A9 3F 99
1390:8D 93 14 A2 19 A9 87 20 AD
1398:B8 13 A9 00 A2 12 20 B8 6B
13A0:13 A2 13 20 B8 13 A9 00 C2
13A8:20 B6 13 CE 92 14 D0 F6 59
13B0:CE 93 14 D0 F1 60 A2 1F 28
13B8:8E 00 D6 2C 00 D6 10 FB 3B
13C0:8D 01 D6 60 8E 00 D6 2C 1D
13C8:00 D6 10 FB AD 01 D6 60 E5
13D0:18 A5 FD 69 08 85 FD 90 A5
13D8:02 E6 FE 60 20 F5 13 60 FE
13E0:38 A5 FE E9 01 85 FE A5 CC
13E8:FD E9 37 85 FD 60 E6 FD 05
13F0:D0 02 E6 FE 60 A2 12 20 9E
13F8:C4 13 8D 9A 14 A2 13 20 13
1400:C4 13 8D 9B 14 AD 9B 14 5D
1408:18 69 28 8D 9B 14 AD 9A 97
1410:14 69 00 8D 9A 14 A2 12 F1
1418:AD 9A 14 20 B8 13 A2 13 AC
1420:AD 9B 14 20 B8 13 60 A2 FF
1428:12 20 C4 13 8D 9A 14 A2 CC
1430:13 20 C4 13 8D 9B 14 AD 64
1438:9B 14 38 E9 01 8D 9B 14 62
1440:AD 9A 14 E9 00 8D 9A 14 86
1448:A2 12 AD 9A 14 20 B8 13 4B
1450:A2 13 AD 9B 14 20 B8 13 A3
1458:60 8D 9C 14 A2 1F 20 C4 7F
1460:13 8D 9D 14 20 27 14 AD DD
1468:99 14 F0 07 C9 01 F0 0D 32
1470:4C 87 14 AD 9C 14 0D 9D EA
1478:14 20 B6 13 60 AD 9C 14 C1
1480:2D 9D 14 20 B6 13 60 AD 9B
1488:9C 14 4D 9D 14 20 B6 13 29
1490:60 00 00 00 00 00 00 00 E8
1498:00 00 00 00 00 00 00 00 C0
```

Program 2: HI-RES 80 DEMO

```
SE 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS INC., A
      LL RIGHTS RESERVED
QJ 20 BLOAD"HI-RES 80":IFPEEK(
      215)THENS$="{20 SPACES}"
      :ELSE S$=""
DE 30 PRINT"{CLR}{N}"S$SPC(13)
      "COPYRIGHT 1989"
BF 40 PRINTS$SPC(7)"COMPUTE! P
      UBLICATIONS, INC."
SX 50 PRINTS$SPC(10)"ALL RIGHT
      S RESERVED.{7 DOWN}"
HQ 60 PRINTS$SPC(13)"HI-RES 80
       DEMO{7 DOWN}"
```

```
BR 70 PRINTSSSPC(4)"ARE YOU IN
      40-COLUMN MODE? (Y/N)"
EM 80 GETKEYA$:IFA$="N"THENPRI
      NTCHR$(27)"X":GOTO120
FM 90 PRINT"{CLR}{4 DOWN}{N} S
      ELECT 80-COLUMN MODE ON
      {SPACE}YOUR MONITOR"
EF 100 PRINTSPC(11)"AND PRESS
       {SPACE}ANY KEY."
PH 110 GETKEYA$
SD 120 FAST:BANK15
EJ 130 GRAPHIC1:SCNCLR:CHAR1,4
       ,12,"{N}CREATE DAZZLING
       80-COLUMN"
FC 140 CHAR1,4,13,"{N}
       {3 SPACES}GRAPHICS EASI
       LY!!"
PE 150 SYS4864,1,22,0:SCNCLR
FE 160 FORX=0TO320STEP5:DRAW1,
       X,0 TO 320-X,200:NEXT:S
       YS4864,0,0,0:SYS4864,0,
       40,0:SYS4864,0,1,2:SYS4
       864,0,39,2
JG 170 SCNCLR:CIRCLE 1,160,100
       ,100,50:DRAW 1,160,100
       {SPACE}TO 160,50
JM 180 CHAR1,15,14,"C=6.28 X R
       "
GE 190 CHAR1,8,20,"{N}CREATE T
       ECHNICAL DRAWINGS!"
KQ 200 SLEEP5:SYS 4864,1,20,0:
       SCNCLR
MB 210 SLEEP5:SYS 4864,1,0,0:C
       IRCLE1,160,100,50,25
CJ 220 FORT=2TO40STEP2:SYS4864
       ,0,T,0:NEXT
JJ 230 CHAR1,0,0,"{N}MORE OPTI
       CAL ILLUSIONS!"
MA 240 SYS 4864,0,25,0:SLEEP5
RG 250 SYS52684,71,25:SYS65378
       :PRINTCHR$(27)"X{CLR}
       {N}YOU'RE ALWAYS AVAILA
       BLE FOR TEXT, TOO!"
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How to Type In COMPUTE!'s Gazette Programs," elsewhere in this issue.

SpeedCount

Article on page 41.

```
FH 10 REM COPYRIGHT 1989 COMPU
      TE! PUBLICATIONS, INC. -
       ALL RIGHTS RESERVED
BQ 20 PRINTCHR$(147)"LOADING";
      :FORJ=53000TO53239:READA
      :POKEJ,A:X=X+A:PRINT".";
CD 30 NEXTJ:PRINT:PRINT:IFX<>2
      8160THENPRINT"ERROR IN D
      ATA...":END
BJ 40 PRINT"DATA OK... LOADING
       'SPEEDSCRIPT'...":SYS53
      000
JF 50 DATA169,5,162,8,168,32,1
      86,255,169,11,162,237
FQ 60 DATA160,207,32,189,255,1
      69,0,133,10,141,249,207
DF 70 DATA32,213,255,169,48,16
      2,207,141,134,10,142,135
GX 80 DATA10,76,13,8,160,0,173
      ,249,207,208,15,238
PQ 90 DATA249,207,132,63,132,6
      5,132,66,132,67,169,37
MP 100 DATA133,64,165,1,141,24
       8,207,169,54,133,1,169
KP 110 DATA47,133,0,177,63,208
       ,2,169,1,16,2,73
BM 120 DATA128,201,27,144,38,2
       01,31,240,4,201,32,208
BH 130 DATA14,165,67,240,28,13
       2,67,230,65,208,22,230
PQ 140 DATA66,208,18,201,48,14
       4,14,201,58,144,8,201
XE 150 DATA65,144,6,201,91,176
       ,2,133,67,165,63,205
AD 160 DATA23,32,208,7,165,64,
       205,24,32,176,12,230
KR 170 DATA63,208,184,230,64,1
       65,64,201,207,144,62,16
       5
RQ 180 DATA66,166,65,160,55,13
       2,1,160,47,132,0,133
DF 190 DATA98,134,99,162,144,5
       6,32,73,188,32,223,189
CG 200 DATA160,32,140,34,4,162
       ,0,142,249,207,189,0
QS 210 DATA1,240,11,157,35,4,1
       69,1,157,35,216,232
JM 220 DATA208,240,152,224,5,1
       76,6,157,35,4,232,208
AD 230 DATA246,173,248,207,133
       ,1,169,47,133,0,76,228
GC 240 DATA255,83,80,69,69,68,
       83,67,82,73,80,84
```

MacroBASIC

See instructions in article on page 58 before typing in.

Program 1: MacroBASIC 64

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:33 00 00 00 00 00 A9 01 07
0811:85 FB A9 08 85 FC A9 00 0C
0819:85 FD A8 A9 C0 85 FE 20 55
0821:80 08 C0 E6 D0 F9 A5 FE B2
0829:C9 CD D0 F3 98 18 65 FB D6
0831:85 FB A9 00 65 FC 85 FC 5F
0839:A0 00 84 FD A9 E0 85 FE E4
0841:20 80 08 CC F0 CB D0 F8 A0
0849:A5 FE CD F1 CB D0 F1 A9 F3
0851:00 8D 20 D0 8D 21 D0 A9 12
0859:C0 A2 8B 8D 03 03 8E 02 FF
0861:03 A9 81 A0 CA 20 1E AB 56
0869:A9 B4 A0 CB 20 1E AB A9 C6
0871:0D 8D 77 02 A9 96 8D 78 B5
0879:02 A9 02 8D C6 00 60 B1 B6
0881:FB 91 FD C8 D0 04 E6 FC A1
0889:E6 FE 60 A5 3A C9 FF F0 1D
0891:03 4C 83 A4 AD B3 CB D0 95
0899:17 20 60 A5 8E 72 CA 8C 04
08A1:73 CA 86 7A 84 7B 20 8E 77
08A9:C9 C9 00 D0 3A 4C 80 A4 C6
08B1:20 DB C1 B0 1E A9 8D 20 DE
08B9:CA F1 A9 91 20 CA F1 A9 B3
08C1:0D 8D 77 02 A9 01 8D C6 FD
08C9:00 20 60 A5 86 7A 84 7B EA
08D1:4C 8A A4 AE 72 CA AC 73 B5
08D9:CA 86 7A 8C 7B 00 20 8E B3
08E1:C9 4C 80 A4 4C 80 A4 AE A0
08E9:70 CA F0 0A C9 3D D0 03 8B
08F1:4C 13 C6 4C D9 C5 C9 5E 62
08F9:D0 08 A2 00 8E AC CB 4C D3
0901:4C C1 C9 24 D0 03 4C 7C CC
0909:C7 C9 40 D0 03 4C 3A C8 0D
0911:C9 5C D0 03 4C 78 C8 C9 09
0919:3D D0 03 4C 87 C5 C9 5F 69
0921:D0 08 A2 01 8E AC CB 4C 0D
0929:4C C1 C9 2A D0 03 4C F6 CF
0931:C2 C9 2B D0 03 4C A2 C3 DB
0939:C9 FF D0 03 4C 22 C4 AE 9D
0941:72 CA AC 73 CA 86 7A 84 F5
0949:7B 4C 8A A4 20 E6 C8 90 86
0951:07 A9 E3 A0 CA 4C 61 C1 E3
0959:20 09 C9 D0 0A A9 00 A0 9B
0961:CB 20 1E AB 4C 80 A4 8E 1C
0969:EE C9 8C EF C9 20 9E C1 C3
0971:20 76 C1 4C 80 A4 A2 08 12
0979:20 ED C9 8D 7C CA E8 20 2A
0981:ED C9 8D 7E CA AD AC CB C8
0989:F0 0C A9 01 8D B3 CB 60 8F
0991:20 DB C1 90 01 60 A9 8D 56
0999:20 CA F1 4C 90 C1 A9 00 50
09A1:8D AE CB 8D E8 CB 8D E9 F3
09A9:CB 20 94 C9 C9 5C F0 01 7B
09B1:60 20 8E C9 20 AB C2 90 30
09B9:01 60 8D AE CB 8D AF CB C0
09C1:38 E9 30 20 F1 C9 20 8E F7
09C9:C9 20 AB C2 90 F2 AD E8 FE
09D1:CB 8D A7 CB AD E9 CB 8D 19
09D9:A8 CB 60 AD 7C CA 8D CD 12
09E1:C9 AD 7E CA 8D CE C9 AD A9
09E9:AE CB F0 33 AD AF CB D0 2C
09F1:06 20 D8 C2 4C 1F C2 20 DA
09F9:B4 C2 90 08 A9 00 8D AE C0
0A01:CB 4C 1F C2 AD A7 CB 38 F9
0A09:ED E8 CB 8D B0 CB AD A8 59
0A11:CB ED E9 CB 8D B1 CB A9 F4
0A19:00 8D AF CB 20 5F C2 20 67
0A21:C5 C9 20 D3 C9 C9 00 D0 12
0A29:07 A2 00 8E B3 CB 38 60 EF
0A31:C9 0D D0 0E AE CD C9 AC 55
0A39:CE C9 8E 7C CA 8C 7E CA 11
0A41:18 60 C9 8D F0 EE C9 5C BE
0A49:F0 06 20 CA F1 4C 1F C2 C9
0A51:AD AE CB F0 05 20 D8 C2 8D
0A59:90 C5 A9 5C 4C 4A C2 A2 D5
0A61:00 8E A6 CB A9 00 8D AB BE
0A69:CB AD A7 CB 38 FD 9C CB 3F
0A71:8D A9 CB AD A8 CB FD 9D 19
0A79:CB 90 0F EE AB CB 8D A8 B8
0A81:CB AD A9 CB 8D A7 CB 4C C7
0A89:69 C2 AD AB CB D0 09 E0 08
0A91:08 F0 05 AC A6 CB F0 0E A5
0A99:18 69 30 8D A6 CB 20 CA 62
0AA1:F1 E0 08 D0 01 60 E8 E8 39
0AA9:4C 64 C2 C9 30 90 03 C9 85
0AB1:3A 60 38 60 A9 00 8D E8 59
0AB9:CB 8D E9 CB 20 C5 C9 20 DC
0AC1:AB C2 90 01 60 38 E9 30 66
0AC9:20 F1 C9 20 D3 C9 20 C5 71
0AD1:C9 20 AB C2 90 EF 18 60 49
0AD9:20 B4 C2 90 01 60 AD E8 5A
0AE1:CB 18 6D B0 CB 8D A7 CB 4A
0AE9:AD E9 CB 6D B1 CB 8D A8 20
0AF1:CB 20 5F C2 18 60 A0 57 E6
0AF9:20 ED C3 20 C9 FF A9 01 B6
0B01:20 A8 FF A9 08 20 A8 FF FD
0B09:A9 00 A2 C0 8D CD C9 8E 1A
0B11:CE C9 A9 E5 A2 CD 8D B2 AE
0B19:C9 8E B7 C9 8E 7B CA 20 63
0B21:C5 C9 20 A8 FF 20 AD C9 C0
0B29:AE 7B CA F0 03 4C 1F C3 29
0B31:A9 00 A2 E0 8E 7B CA 8D 04
0B39:CD C9 8E CE C9 AD F0 CB 1A
0B41:8D B2 C9 AD F1 CB 8D B7 70
0B49:C9 20 C5 C9 20 A8 FF 20 65
0B51:AD C9 AE 7B CA F0 03 4C AA
0B59:49 C3 20 AE FF A9 08 20 CA
0B61:C3 FF 20 CC FF 4C 80 A4 01
0B69:A0 52 20 ED C3 20 C6 FF 73
0B71:20 A5 FF A5 90 F0 13 20 E9
0B79:AB FF A9 08 20 C3 FF 20 4B
0B81:CC FF A9 00 8D E6 CB 4C 1F
0B89:3D C8 A9 F0 A2 0C 8D 9A AF
0B91:CB 8E 9B CB 20 A5 FF CE C7
0B99:9A CB D0 F8 CE 9B CB D0 E6
0BA1:F3 60 20 68 C3 A9 EF A2 9B
0BA9:CB 8D E2 C9 8E E3 C9 A9 43
0BB1:F7 A2 02 8D 9A CB 8E 9B 42
0BB9:CB 20 A5 FF 20 E1 C9 CE 5D
0BC1:9A CB D0 F5 CE 9B CB D0 DE
0BC9:F0 A9 00 A2 E0 8D E2 C9 B9
0BD1:8E E3 C9 20 A5 FF 20 E1 B2
0BD9:C9 A5 90 29 40 F0 F4 20 B2
0BE1:AB FF A9 08 20 C3 FF 20 B3
0BE9:CC FF 4C 78 C8 20 5E C9 C4
0BF1:90 03 4C 2D C8 E8 A9 2C D6
0BF9:9D E6 CD E8 A9 50 9D E6 91
0C01:CD E8 A9 2C 9D E6 CD E8 3F
```

```
0C09:98 9D E6 CD E8 8A A2 E6 2C
0C11:A0 CD 20 BD FF A9 08 AA 2E
0C19:A8 20 BA FF 20 C0 FF A2 8B
0C21:08 60 20 68 C3 20 A5 FF C9
0C29:C9 00 D0 03 4C DF C3 8D 67
0C31:E7 CB 20 A5 FF 20 A5 FF 5A
0C39:A9 FB A0 CD 8D E2 C9 8C 2E
0C41:E3 C9 A9 F4 A2 02 8D 9A 15
0C49:CB 8E 9B CB 20 A5 FF 20 D2
0C51:E1 C9 CE 9A CB D0 F5 CE AC
0C59:9B CB D0 F0 A9 00 8D B2 76
0C61:CB AD E7 CB D0 03 4C DF 8F
0C69:C3 AD EF CB C9 32 90 0A CB
0C71:A9 14 A0 CB 20 1E AB 4C 51
0C79:DF C3 AD B2 CB 8D E8 CB 85
0C81:A9 00 8D E9 CB 20 F1 C9 4B
0C89:A9 FB 18 6D E8 CB 8D EE CF
0C91:C9 A9 CD 6D E9 CB 8D EF 13
0C99:C9 A2 07 20 ED C9 9D 58 4C
0CA1:CB CA 10 F7 20 09 C9 F0 7D
0CA9:14 A9 D3 A0 CA 20 1E AB 79
0CB1:A9 58 A0 CB 20 1E AB 20 76
0CB9:71 C5 4C 5F C5 AD EF CB 0C
0CC1:8D E8 CB A9 00 8D E9 CB C4
0CC9:20 F1 C9 A9 F2 18 6D E8 FD
0CD1:CB 8D 5B C9 A9 CB 6D E9 7C
0CD9:CB 8D 5C C9 A2 07 20 ED C2
0CE1:C9 20 5A C9 CA 10 F7 A2 F7
0CE9:08 AD F0 CB 8D 78 CA 8D BD
0CF1:E2 C9 20 5A C9 E8 AD F1 D6
0CF9:CB 8D 79 CA 8D E3 C9 20 E6
0D01:5A C9 20 A5 FF 20 E1 C9 27
0D09:D0 14 A9 58 A0 CB 20 1E DD
0D11:AB A9 9F A0 CA 20 1E AB 28
0D19:20 71 C5 4C 5F C5 C9 00 C2
0D21:D0 E0 AD E2 C9 AE E3 C9 5A
0D29:8D F0 CB 8D F1 CB A9 58 03
0D31:A0 CB 20 1E AB A9 C3 A0 A0
0D39:CA 20 1E AB A2 00 20 C6 5B
0D41:FF 20 E4 FF C9 00 F0 F9 2A
0D49:C9 59 F0 1C C9 4E D0 F1 99
0D51:20 79 C5 AD 78 CA AE 79 33
0D59:CA 8D F0 CB 8E F1 CB EE D9
0D61:B2 CB CE E7 CB 4C 61 C4 37
0D69:20 79 C5 EE EF CB 4C 5F 40
0D71:C5 20 A5 FF C9 00 D0 F9 15
0D79:60 20 CA F1 A9 8D 20 CA D2
0D81:F1 A2 08 20 C6 FF 60 20 57
0D89:E6 C8 90 0A A9 E3 A0 CA E4
0D91:20 1E AB 4C 80 A4 20 09 5D
0D99:C9 F0 03 4C 89 C6 AD EF AC
0DA1:CB C9 32 D0 0A A9 14 A0 27
0DA9:CB 20 1E AB 4C 80 A4 AD 8B
0DB1:F0 CB AC F1 CB 8D 10 C6 67
0DB9:8C 11 C6 A9 01 8D 70 CA BB
0DC1:A9 4D A0 CB 20 1E AB A9 4F
0DC9:58 A0 CB 20 1E AB 20 54 E7
0DD1:CA 4C 80 A4 20 8E C9 F0 7E
0DD9:0F 20 0F C6 EE 10 C6 D0 E7
0DE1:F3 EE 11 C6 D0 EE F0 15 79
0DE9:A9 8D 20 0F C6 EE 10 C6 0A
0DF1:D0 05 EE 11 C6 F0 06 20 CA
0DF9:54 CA 4C 80 A4 A9 A0 A0 30
0E01:CA 20 1E AB 20 54 CA A2 93
0E09:00 8E 70 CA 4C 80 A4 8D BE
0E11:2C E3 60 A9 00 20 0F C6 48
0E19:EE 10 C6 D0 03 EE 11 C6 53
0E21:AD EF CB 8D E8 CB A9 00 2C
0E29:8D E9 CB 20 F1 C9 AD E8 FC
0E31:CB 18 69 F2 8D 5B C9 A9 AC
0E39:00 69 CB 8D 5C C9 A2 07 58
0E41:BD 58 CB 20 5A C9 CA 10 6D
0E49:F7 EE EF CB AD F0 CB A2 43
0E51:08 20 5A C9 E8 AD F1 CB 0F
0E59:20 5A C9 8A 18 69 09 AA 21
0E61:AD 10 C6 8D F0 CB 20 5A 5B
0E69:C9 E8 AD 11 C6 8D F1 CB 87
0E71:20 5A C9 A9 00 8D 70 CA E9
0E79:A9 94 A0 CA 20 1E AB A9 CA
0E81:58 A0 CB 20 1E AB 4C 80 26
0E89:A4 8E EE C9 8C EF C9 8D 5B
0E91:80 CA A9 72 A0 CB 20 1E 8F
0E99:AB 20 E4 FF C9 00 F0 F9 5A
0EA1:C9 4E D0 08 A9 8D 20 CA 5F
0EA9:F1 4C 80 A4 C9 59 D0 E9 6B
0EB1:AD EF CB C9 01 D0 1A A9 DF
0EB9:00 8D F0 CB A9 E0 8D F1 F1
0EC1:CB CE EF CB A9 62 A0 CB 16
0EC9:20 1E AB 20 54 CA 4C 80 DB
0ED1:A4 AD 80 CA CD EF CB D0 FE
0ED9:12 A2 08 20 ED C9 8D F0 4D
0EE1:CB E8 20 ED C9 8D F1 CB 35
0EE9:4C C1 C6 AE EE C9 8E 5B 77
0EF1:C9 AE EF C9 8E 5C C9 A2 55
0EF9:11 8E E9 CB A2 07 8E E8 73
0F01:CB AE E9 CB 20 ED C9 AE A5
0F09:E8 CB 20 5A C9 CE E9 CB 61
0F11:CA 10 EB A2 12 20 ED C9 F6
0F19:8D CD C9 E8 20 ED C9 8D 13
0F21:CE C9 A2 08 20 ED C9 8D C7
0F29:E2 C9 E8 20 ED C9 8D E3 DF
0F31:C9 20 C5 C9 20 E1 C9 20 CD
0F39:D3 C9 C9 00 D0 F3 AE 80 21
0F41:CA E8 EC EF CB F0 26 8E 98
0F49:80 CA A2 12 AD E2 C9 20 7C
0F51:5A C9 E8 AD E3 C9 20 5A E7
0F59:C9 A9 0A 18 6D EE C9 8D D1
0F61:EE C9 A9 00 6D EF C9 8D EA
0F69:EF C9 4C EB C6 AD E2 C9 B6
0F71:8D F0 CB AD E3 C9 8D F1 3A
0F79:CB 4C C1 C6 A9 02 A0 CB 97
0F81:A2 E4 20 BD FF A9 08 A2 63
0F89:08 A0 00 20 BA FF 20 C0 AC
0F91:FF A2 08 20 C6 FF 20 A5 77
0F99:FF 8D D3 CB 20 A5 FF 8D 77
0FA1:D4 CB 20 A5 FF 8D D3 CB 25
0FA9:20 A5 FF 8D D4 CB 20 A5 D5
0FB1:FF 8D D3 CB 20 A5 FF 8D 8F
0FB9:D4 CB AE D3 CB 20 CD BD 80
0FC1:A9 03 8D D3 00 20 A5 FF 30
0FC9:8D D4 CB A5 90 29 40 D0 32
0FD1:47 AD D4 CB C9 22 D0 ED BC
0FD9:20 A5 FF 8D D4 CB C9 22 D5
0FE1:F0 06 20 CA F1 4C D8 C7 E4
0FE9:20 A5 FF 8D D4 CB C9 20 E3
0FF1:F0 F6 A2 14 86 D3 AD D4 8F
0FF9:CB F0 03 20 CA F1 20 A5 A0
1001:FF 8D D4 CB F0 06 20 CA 86
1009:F1 4C FE C7 A9 8D 20 CA 20
1011:F1 A6 90 D0 03 4C A2 C7 49
1019:A9 D6 A0 CB 20 1E AB 20 85
1021:AB FF A9 08 20 C3 FF 20 FC
1029:CC FF 4C 80 A4 A9 8D A0 C8
1031:CB 20 1E AB 20 54 CA 4C F1
1039:80 A4 20 5E C9 AD E6 CB 4B
1041:A0 CD A2 E6 20 BD FF A9 89
1049:0F A2 08 A0 0F 20 BA FF 13
1051:20 C0 FF A2 0F 20 C6 FF 62
1059:20 A5 FF C9 0D F0 06 20 E7
1061:CA F1 4C 58 C8 A9 8D 20 9A
1069:CA F1 20 AB FF A9 0F 20 0F
1071:C3 FF 20 CC FF 4C 80 A4 1B
1079:AC EF CB D0 0A A9 26 A0 56
1081:CB 20 1E AB 4C 80 A4 8C 48
1089:80 CA A9 F1 8D AB C8 A9 47
1091:CB 8D AC C8 A9 3B A0 CB 64
1099:20 1E AB A9 20 8D EE CD 44
10A1:8D EF CD A9 00 8D F0 CD BE
10A9:A2 08 BD 19 CC 9D E5 CD DC
10B1:CA D0 F7 8E F1 CD 8E F0 28
10B9:CD A9 E6 A0 CD CE 80 CA 87
10C1:D0 05 A2 8D 8E F0 CD 20 AC
10C9:1E AB AC 80 CA D0 03 4C 6D
10D1:80 A4 A9 0A 18 6D AB C8 C7
10D9:8D AB C8 A9 00 6D AC C8 37
10E1:8D AC C8 4C A8 C8 A2 08 87
10E9:A9 20 9D 57 CB CA D0 FA 36
10F1:20 8E C9 F0 0C B0 0A E0 26
10F9:08 F0 0A 9D 58 CB E8 D0 0A
1101:EF E0 00 D0 02 38 60 18 2A
1109:60 AD EF CB D0 03 4C 43 EF
1111:C9 8D 80 CA A9 F2 A0 CB 5E
1119:8D 21 C9 8C 22 C9 A2 00 C9
1121:BD 1A CC DD 58 CB D0 16 C9
1129:E8 E0 08 D0 F3 AE 21 C9 6C
1131:AC 22 C9 AD EF CB 38 ED 53
1139:80 CA 18 69 01 60 CE 80 8F
1141:CA D0 03 A9 00 60 A9 0A D6
1149:18 6D 21 C9 8D 21 C9 A9 C1
1151:00 6D 22 C9 8D 22 C9 4C 84
1159:1E C9 9D 1A CC 60 8C AF 03
1161:CB A2 00 8E E6 CB 20 8E 30
1169:C9 F0 19 C9 22 D0 09 20 F2
1171:8E C9 F0 15 C9 22 F0 11 86
1179:AE E6 CB 9D E6 CD EE E6 33
1181:CB 4C 6F C9 AC AF CB 38 1B
1189:60 AC AF CB 18 60 E6 7A 44
1191:D0 02 E6 7B A0 00 B1 7A 14
1199:8D 74 CA C9 5C F0 09 C9 18
11A1:5F F0 05 18 AD 74 CA 60 07
11A9:38 AD 74 CA 60 AD CD C9 AD
11B1:38 E9 E5 AD CE C9 E9 CD 41
11B9:B0 05 20 D3 C9 18 60 A9 CF
11C1:00 8D 7B CA 60 A6 01 A0 A3
11C9:04 78 84 01 AD CD C9 86 6B
11D1:01 58 60 EE CD C9 D0 07 C3
11D9:EE CE C9 D0 02 38 60 18 37
11E1:60 8D EE E2 EE E2 C9 D0 0B
11E9:03 EE E3 C9 60 BD 1A CC 5D
11F1:60 8D EE CB AD E8 CB 8D 78
11F9:EA CB AD E9 CB 8D EB CB 11
1201:20 3B CA AD EA CB 8D EC C6
1209:CB AD EB CB 8D ED CB 20 94
1211:3B CA 20 3B CA AD EA CB EB
1219:18 6D EC CB 8D EA CB AD 5C
1221:EB CB 6D ED CB 8D EB CB F2
1229:AD EA CB 18 6D EE CB 8D 26
1231:E8 CB AD EB CB 69 00 8D C2
1239:E9 CB 60 0E EA CB 2E EB 01
1241:CB 60 C9 30 90 0C C9 3A 22
1249:B0 08 38 E9 30 20 F1 C9 1D
1251:18 60 38 60 A2 10 AD 20 77
1259:D0 18 69 05 29 0F 8D 20 2A
1261:D0 CA F0 0B A9 00 69 01 90
1269:C9 80 D0 FA 4C 56 CA 60 0E
1271:00 00 FF 01 00 00 00 00 A5
1279:00 00 00 CD 2B 00 E3 00 9B
1281:01 93 1E 20 20 20 20 20 B2
1289:20 20 20 20 20 20 20 20 AD
1291:20 9E 8D 00 12 43 52 45 A6
1299:41 54 45 44 3A 20 00 2D DF
12A1:12 4F 55 54 20 4F 46 20 7D
12A9:52 4F 4F 4D 8D 12 20 44 C2
12B1:45 4C 45 54 45 20 53 4F 1A
12B9:4D 45 20 4D 41 43 52 4F B9
12C1:53 8D 00 20 4B 45 45 50 3F
12C9:20 49 54 3F 20 28 59 2F 52
12D1:4E 29 00 44 55 50 4C 49 79
12D9:43 41 54 45 20 4E 41 4D D8
12E1:45 3A 00 12 49 4E 56 41 C9
12E9:4C 49 44 20 4D 41 43 52 59
12F1:4F 20 4E 41 4D 45 8D 00 3E
12F9:12 53 41 56 45 44 8D 00 DF
1301:12 4D 41 43 52 4F 20 4E 3E
1309:4F 54 20 43 52 45 41 54 A2
1311:45 44 8D 00 12 54 4F 4F 6C
1319:20 4D 41 4E 59 20 4D 41 D6
1321:43 52 4F 53 8D 00 12 20 4D
1329:4E 4F 20 4D 41 43 52 4F 2E
1331:53 20 43 52 45 41 54 45 B3
1339:44 8D 00 12 43 52 45 41 35
1341:54 45 44 20 4D 41 43 52 B5
1349:4F 53 3A 8D 00 12 43 52 2D
1351:45 41 54 49 4E 47 20 00 59
1359:57 41 49 54 20 20 20 20 CB
1361:8D 00 12 4D 41 43 52 4F 70
1369:20 44 45 4C 45 54 45 44 68
1371:8D 00 12 45 58 49 53 54 D7
1379:53 2E 20 44 45 4C 45 54 57
1381:45 20 49 54 20 28 59 2F 44
1389:4E 29 3F 20 00 12 44 49 25
1391:53 4B 20 45 52 52 4F 52 59
1399:8D 00 00 00 00 10 27 E8 03 78
13A1:64 00 0A 00 01 00 35 00 AD
13A9:00 FF 00 05 00 00 00 57 77
13B1:23 23 00 00 12 20 20 20 A3
13B9:4D 41 43 52 4F 20 42 41 25
13C1:53 49 43 20 20 20 92 8D 82
13C9:90 11 11 4E 45 57 8D 91 B7
13D1:91 91 00 7F 00 00 20 42 9F
13D9:4C 4F 43 4B 53 20 46 52 11
13E1:45 45 8D 00 24 30 03 00 95
13E9:00 00 0A 00 02 00 00 05 66
13F1:2C E3 42 49 54 53 20 20 54
13F9:20 20 00 E0 44 45 56 49 73
```

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1401:43 45 39 20 91 E0 43 4F 2B
1409:4C 4F 52 20 20 20 2C E1 33
1411:48 45 4C 50 20 20 20 20 1F
1419:50 E1 57 41 49 54 20 20 DC
1421:20 20 EE E2 44 45 56 49 9A
1429:43 45 39 20 2C E3 44 45 2C
1431:56 49 43 45 39 20 09 E3 D3
1439:44 45 56 49 43 45 38 20 F3
1441:A4 E3 00 00 00 00 00 00 B4
1449:00 00 F2 E3 00 00 00 00 0E
1451:00 00 00 00 00 00 00 00 79
1459:00 00 00 00 00 00 00 00 81
1461:00 00 00 00 00 00 00 00 89
1469:00 00 00 00 00 00 00 00 91
1471:00 00 00 00 00 00 00 00 99
1479:00 00 00 00 00 00 00 00 A1
1481:00 00 00 00 00 00 00 00 A9
1489:00 00 00 00 00 00 00 00 B1
1491:00 00 00 00 00 00 00 00 B9
1499:00 00 00 00 00 00 00 00 C1
14A1:00 00 00 00 00 00 00 00 C9
14A9:00 00 00 00 00 00 00 00 D1
14B1:00 00 00 00 00 00 00 00 D9
14B9:00 00 00 00 00 00 00 00 E1
14C1:00 00 00 00 00 00 00 00 E9
14C9:00 00 00 00 00 00 00 00 F1
14D1:00 00 00 00 00 00 00 00 F9
14D9:00 00 00 00 00 00 00 00 02
14E1:00 00 00 00 00 00 00 00 0A
14E9:00 00 00 00 00 00 00 00 12
14F1:00 00 00 00 00 00 00 00 1A
14F9:00 00 00 00 00 00 00 00 22
1501:00 00 00 00 00 00 00 00 2B
1509:00 00 00 00 00 00 00 00 33
1511:00 00 00 00 00 00 00 00 3B
1519:00 00 00 00 00 00 00 00 43
1521:00 00 00 00 00 00 00 00 4B
1529:00 00 00 00 00 00 00 00 53
1531:00 00 00 00 00 00 00 00 5B
1539:00 00 00 00 00 00 00 00 63
1541:00 00 00 00 00 00 00 00 6B
1549:00 00 00 00 00 00 00 00 73
1551:00 00 00 00 00 00 00 00 7B
1559:00 00 00 00 00 00 00 00 83
1561:00 00 00 00 00 00 00 00 8B
1569:00 00 00 00 00 00 00 00 93
1571:00 00 00 00 00 00 00 00 9B
1579:00 00 00 00 00 00 00 00 A3
1581:00 00 00 00 00 00 00 00 AB
1589:00 00 00 00 00 00 00 00 B3
1591:00 00 00 00 00 00 00 00 BB
1599:00 00 00 00 00 00 00 00 C3
15A1:00 00 00 00 00 00 00 00 CB
15A9:00 00 00 00 00 00 00 00 D3
15B1:00 00 00 00 00 00 00 00 DB
15B9:00 00 00 00 00 00 00 00 E3
15C1:00 00 00 00 00 00 00 00 EB
15C9:00 00 00 00 00 00 00 00 F3
15D1:00 00 00 00 00 00 00 00 FB
15D9:00 00 00 00 00 00 00 00 04
15E1:00 00 00 00 00 00 31 30 9E
15E9:30 20 44 49 4D 20 42 53 14
15F1:25 28 37 29 2C 42 43 25 48
15F9:28 37 29 8D 31 31 30 20 D2
1601:46 4F 52 20 49 3D 30 54 64
1609:4F 37 3A 20 42 53 25 28 C5
1611:49 29 3D 32 5E 49 8D 31 5B
1619:32 30 20 42 43 25 28 49 DA
1621:29 3D 32 35 35 2D 42 53 01
1629:25 28 49 29 3A 20 4E 45 E1
1631:58 54 8D 31 33 30 20 44 42
1639:45 46 20 46 4E 42 53 28 4C
1641:58 29 3D 42 53 25 28 42 71
1649:4E 29 4F 52 50 45 45 4B 63
1651:28 58 29 8D 31 34 30 20 80
1659:44 45 46 20 46 4E 42 43 F6
1661:28 58 29 3D 42 43 25 28 42
1669:42 4E 29 41 4E 44 50 45 EC
1671:45 4B 28 58 29 8D 00 41 5E
1679:3D 39 3A 52 45 4D 20 44 E2
1681:45 56 49 43 45 20 4E 55 DF
1689:4D 42 45 52 8D 50 4F 4B 52
1691:45 35 30 30 31 34 2C 41 AA
1699:3A 50 4F 4B 45 35 30 30 25
16A1:34 33 2C 41 3A 50 4F 4B 4B
16A9:45 35 31 32 37 34 2C 41 33
16B1:8D 50 4F 4B 45 35 30 31 E7
16B9:34 37 2C 41 3A 50 4F 4B 64
16C1:45 35 30 31 39 38 2C 41 3B
16C9:3A 50 4F 4B 45 35 31 32 59
16D1:33 35 2C 41 8D 50 4F 4B 16
16D9:45 35 30 32 30 38 2C 41 1B
16E1:3A 50 4F 4B 45 35 30 35 72
16E9:36 32 2C 41 3A 50 4F 4B 54
16F1:45 35 31 30 39 30 2C 41 5B
16F9:8D 50 4F 4B 45 35 31 30 31
1701:37 38 2C 41 3A 50 4F 4B 6F
1709:45 35 31 30 38 30 2C 41 6C
1711:8D 00 50 4F 4B 45 35 33 12
1719:32 38 30 2C 30 3A 50 4F 91
1721:4B 45 35 33 32 38 31 2C 21
1729:30 3A 50 4F 4B 45 36 34 0D
1731:36 2C 31 34 8D 00 20 20 BB
1739:20 20 20 20 20 20 20 4D 94
1741:41 43 52 4F 20 42 41 53 FF
1749:49 43 20 36 34 20 43 4F 4C
1751:4D 4D 41 4E 44 53 8D 20 31
1759:8D 20 5C 20 20 20 20 20 C5
1761:20 20 4C 49 53 54 20 41 33
1769:4C 4C 20 4D 41 43 52 4F B4
1771:53 8D 20 5E 4E 4D 20 20 9E
1779:20 20 20 44 49 53 50 4C 8C
1781:41 59 20 4D 41 43 52 4F 8A
1789:20 27 4E 4D 27 8D 20 5F 3F
1791:4E 4D 20 20 20 20 20 45 47
1799:58 45 43 55 54 45 20 4D 48
17A1:41 43 52 4F 20 27 4E 4D 08
17A9:27 8D 20 5F 4E 4D 5C 32 5B
17B1:30 30 20 49 4E 53 45 52 39
17B9:54 20 4D 41 43 52 4F 20 F9
17C1:27 4E 4D 27 20 41 54 20 02
17C9:4C 49 4E 45 20 32 30 30 E8
17D1:8D 20 3D 4E 4D 20 20 20 A6
17D9:20 20 43 52 45 41 54 45 CA
17E1:2F 44 45 4C 45 54 45 20 4C
17E9:4D 41 43 52 4F 20 27 4E 34
17F1:4D 27 8D 20 3D 20 20 20 0F
17F9:20 20 20 20 45 4E 44 20 52
1801:4D 41 43 52 4F 20 43 52 89
1809:45 41 54 49 4F 4E 8D 20 3A
1811:24 20 20 20 20 20 20 20 43
1819:44 49 53 50 4C 41 59 20 67
1821:44 49 53 4B 20 44 49 52 DB
1829:45 43 54 4F 52 59 8D 20 7F
1831:40 20 20 20 20 20 20 20 71
1839:53 45 4E 44 20 44 49 53 6A
1841:4B 20 43 4F 4D 4D 41 4E EC
1849:44 8D 20 2A 4C 49 42 20 D1
1851:20 20 20 53 41 56 45 20 E0
1859:4C 49 42 52 41 52 59 20 95
1861:27 4C 49 42 27 8D 20 2B 60
1869:4C 49 42 20 20 20 20 4C 6A
1871:4F 41 44 20 4C 49 42 52 82
1879:41 52 59 20 27 4C 49 42 4B
1881:27 8D 20 FF 4C 49 42 20 D8
1889:20 20 20 41 44 44 20 4D AA
1891:41 43 52 4F 53 20 46 52 6C
1899:4F 4D 20 4C 49 42 52 41 C6
18A1:52 59 20 27 4C 49 42 27 FA
18A9:8D 20 8D 20 4E 4F 54 45 F9
18B1:20 54 48 41 54 20 41 4C 16
18B9:4C 20 43 4F 4D 4D 41 4E E5
18C1:44 53 20 53 54 41 52 54 C2
18C9:20 49 4E 20 43 4F 4C 2E 46
18D1:20 31 8D 00 35 20 50 52 2D
18D9:49 4E 54 22 50 52 45 53 98
18E1:53 20 41 4E 59 20 4B 45 F7
18E9:59 20 54 4F 20 43 4F 4E 49
18F1:54 49 4E 55 45 22 8D 31 BC
18F9:30 20 47 45 54 4B 59 24 2E
1901:3A 49 46 4B 59 24 3D 22 18
1909:22 54 48 45 4E 5C 31 30 35
1911:8D 00 FF 00 00 00 00 00 0A
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Program 2: MacroBASIC 128

```
1C01:0C 1C CE 04 9E 20 37 31 75
1C09:38 32 00 00 00 A9 20 85 56
1C11:30 20 FA 51 A9 1C 8D 23 D9
1C19:1C A9 13 8D 26 1C A2 00 EB
1C21:BD 01 1C 9D 00 13 E8 D0 C4
1C29:06 EE 23 1C EE 26 1C E0 6F
1C31:8B D0 ED AD 26 1C C9 1B 4C
1C39:D0 E6 A9 FD 85 FB A9 03 1B
1C41:85 FC 8A 18 6D 22 1C 8D 08
1C49:5A 1C A9 00 A8 6D 23 1C 48
1C51:8D 5B 1C A9 FB 8D B9 02 D0
1C59:AD 99 99 A2 01 20 77 FF A3
1C61:A5 FC CD 90 24 D0 07 A5 86
1C69:FB CD 8F 24 F0 11 E6 FB DC
1C71:D0 02 E6 FC EE 5A 1C D0 29
1C79:DF EE 5B 1C 4C 59 1C 4C D6
1C81:82 13 A9 00 8D 20 D0 8D 11
1C89:21 D0 A9 E0 8D 02 03 A9 ED
1C91:16 8D 03 03 A9 08 8D D5 27
1C99:13 20 17 FA 93 1E 20 20 6B
1CA1:20 20 20 20 20 20 20 20 D9
1CA9:20 20 20 20 20 8D 20 20 97
1CB1:4D 41 43 52 4F 20 42 41 2F
1CB9:53 49 43 8D 90 4E 45 57 CE
1CC1:8D 91 96 00 A9 0D 8D 4A DE
1CC9:03 A9 01 85 D0 68 68 4C AB
1CD1:C3 4D FF 01 57 08 B6 0D A4
1CD9:04 30 3A 4A 49 4D 2C 50 34
1CE1:2C 57 41 53 49 43 20 31 2C
1CE9:32 38 2C 50 2C 57 00 00 92
1CF1:00 4D 4F 52 45 20 52 4F 2B
1CF9:4F 4D 20 46 4F 52 20 4D E6
1D01:4F 52 45 20 46 55 4E 09 4F
1D09:00 00 AD FF 03 D0 19 20 A6
1D11:17 FA 4E 4F 20 4D 41 43 50
1D19:52 4F 53 20 43 52 45 41 EB
1D21:54 45 44 8D 00 4C C3 4D 3E
1D29:20 17 FA 4D 41 43 52 4F 78
1D31:53 20 49 4E 20 4D 45 4D 39
1D39:4F 52 59 8D 00 A9 00 8D E7
1D41:FE 03 A9 04 85 03 A9 E6 A3
1D49:85 04 20 59 15 20 58 14 CE
1D51:AD FE 03 D0 F5 4C C3 4D 45
1D59:A0 02 84 FB A0 04 84 FC CF
1D61:A0 00 A2 01 A9 FB 20 74 42
1D69:FF AA F0 07 20 D2 FF C8 F1
1D71:4C 62 14 60 A9 60 85 04 D0
1D79:A9 06 85 03 20 59 15 60 DB
1D81:20 74 14 20 B1 14 AD FE A5
1D89:03 30 03 4C C3 4D 20 17 21
1D91:FA 4F 55 54 20 4F 46 20 F7
1D99:52 4F 4F 4D 2E 20 20 41 03
1DA1:42 4F 52 54 45 44 2E 8D 85
1DA9:00 A2 00 8D FD 03 4C C3 BD
1DB1:4D A2 10 AD 20 D0 18 69 F5
1DB9:05 29 0F 8D 20 D0 CA F0 46
1DC1:0B A9 00 69 01 C9 80 D0 83
1DC9:FA 4C B3 14 60 A2 05 86 6A
1DD1:03 A2 2F 86 04 20 59 15 EC
1DD9:AD FE 03 30 02 18 60 20 5F
1DE1:17 FA 49 4E 56 41 4C 49 0E
1DE9:44 20 4D 41 43 52 4F 20 2E
1DF1:4E 41 4D 45 8D 00 38 60 DE
1DF9:8E 08 14 20 CD 14 90 03 E4
1E01:4C C3 4D AD FE 03 D0 20 9E
1E09:20 17 FA 4D 41 43 52 4F 5A
1E11:20 44 4F 45 53 20 4E 4F B3
1E19:54 20 45 58 49 53 54 2E 24
1E21:8D 00 20 B1 14 4C C3 4D E9
1E29:20 75 15 A9 E7 85 04 A9 17
1E31:05 85 03 20 59 15 AD 08 36
1E39:14 F0 0B A9 80 8D FD 03 F0
1E41:4C C3 4D 20 58 14 A9 44 EA
1E49:85 04 A9 08 85 03 20 59 D0
1E51:15 AD FE 03 D0 ED 4C C3 2E
1E59:4D 85 06 86 07 84 08 08 29
1E61:68 85 05 A2 01 86 02 20 44
1E69:6E FF A5 05 48 A5 06 A6 6D
1E71:07 A4 08 28 60 A9 07 85 1B
1E79:03 A9 A2 85 04 20 59 15 B6
1E81:60 20 CD 14 90 03 4C C3 DD
1E89:4D AD FE 03 F0 60 20 17 48
1E91:FA 4D 41 43 52 4F 20 45 50
1E99:58 49 53 54 53 2E 8D 44 B6
1EA1:45 4C 45 54 45 20 28 59 D5
1EA9:2F 4E 29 20 3F 00 20 EB 5E
1EB1:EE C9 00 F0 F9 C9 4E F0 6B
1EB9:04 C9 59 D0 00 AA 20 D2 60
1EC1:FF A9 8D 20 D2 FF E0 4E C2
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1EC9:D0 03 4C C3 4D A9 7E 85 88
1ED1:04 A9 06 85 03 20 59 15 F3
1ED9:20 17 FA 4D 41 43 52 4F 2B
1EE1:20 44 45 4C 45 54 45 44 F6
1EE9:2E 8D 00 4C C3 4D AD FF 14
1EF1:03 C9 32 D0 17 20 17 FA D7
1EF9:54 4F 4F 20 4D 41 4E 59 85
1F01:20 4D 41 43 52 4F 53 8D 03
1F09:00 4C 14 16 20 1A 16 A9 7D
1F11:01 8D FD 03 20 B1 14 4C 5F
1F19:C3 4D A9 03 85 04 A9 06 87
1F21:85 03 20 59 15 60 A9 00 F9
1F29:85 3D 8D 36 16 A9 02 85 6F
1F31:3E 8D 37 16 60 8D 00 02 75
1F39:EE 36 16 D0 03 EE 37 16 A4
1F41:60 20 47 16 4C C3 4D A9 B7
1F49:10 85 04 A9 06 85 03 20 78
1F51:59 15 EE FF 03 20 17 FA 21
1F59:4D 41 43 52 4F 20 43 52 EF
1F61:45 41 54 45 44 2E 8D 00 67
1F69:20 B1 14 60 A2 00 8E 07 E5
1F71:14 20 A8 17 F0 19 C9 22 E9
1F79:D0 09 20 A8 17 F0 12 C9 5B
1F81:22 F0 0E AE 07 14 9D DB 59
1F89:13 EE 07 14 4C 7A 16 38 DF
1F91:60 18 60 20 6C 16 A9 0F 32
1F99:AE D5 13 A0 0F 20 BA FF 7F
1FA1:AD 07 14 A2 DB A0 13 20 CC
1FA9:BD FF A9 0F A2 0F 20 68 E6
1FB1:FF 20 C0 FF 20 CC FF A2 E6
1FB9:0F 20 C6 FF 20 CF FF 20 C0
1FC1:D2 FF C9 0D D0 F6 20 CC E2
1FC9:FF A9 0F 38 20 C3 FF 4C 34
1FD1:C3 4D 20 D2 FF A9 8D 20 58
1FD9:D2 FF A2 08 20 C6 FF 60 D2
1FE1:A2 FF 86 3C A6 7F F0 03 1E
1FE9:4C C6 4D AD FD 03 30 16 F6
1FF1:20 93 4F 8E D2 13 8C D3 C7
1FF9:13 86 3D 84 3E 20 A8 17 2E
2001:AA D0 06 4C C3 4D 4C 75 B1
2009:17 AE FD 03 F0 0A C9 3D F0
2011:D0 03 4C 41 16 4C 80 14 0F
2019:C9 5E D0 05 A2 00 4C F8 E6
2021:14 C9 5C D0 03 4C 0A 14 E7
2029:C9 3D D0 03 4C 81 15 C9 44
2031:5F D0 05 A2 01 4C F8 14 5F
2039:C9 24 D0 09 20 A8 17 20 04
2041:7E A0 4C C3 4D C9 40 D0 91
2049:03 4C 93 16 C9 2A D0 03 8D
2051:4C 18 18 C9 2B D0 03 4C 4C
2059:8D 18 C9 FF D0 03 4C 7D 48
2061:19 C9 23 D0 03 4C BA 1A EA
2069:AE D2 13 AC D3 13 84 3E 15
2071:86 3D 4C D1 4D A9 44 85 0A
2079:04 A9 08 85 03 20 59 15 DF
2081:AD FE 03 F0 1B 20 58 14 E5
2089:A9 91 20 D2 FF A9 0D 8D 82
2091:4A 03 A9 01 85 D0 20 93 40
2099:4F 86 3D 84 3E 4C D1 4D 27
20A1:A2 00 8D FD 03 4C C3 4D E2
20A9:E6 3D D0 02 E6 3E A0 00 58
20B1:B1 3D 8D 09 14 C9 5C F0 CD
20B9:05 18 AD 09 14 60 38 AD 09
20C1:09 14 60 8C D4 13 20 6C FF
20C9:16 AE 07 14 D0 05 20 DF 9D
20D1:18 38 60 A9 2C 9D DB 13 75
20D9:A9 50 E8 9D DB 13 A9 2C A4
20E1:E8 9D DB 13 AD D4 13 E8 7A
20E9:9D DB 13 E8 E8 E8 8E 07 EF
20F1:14 A9 08 AE D5 13 A0 08 D6
20F9:20 BA FF AD 07 14 A2 D9 7B
2101:A0 13 20 BD FF A9 0F A2 9F
2109:0F 20 68 FF 20 C0 FF 90 7C
2111:05 20 47 19 38 60 18 60 2C
2119:A0 57 20 C3 17 90 03 4C 0F
2121:C3 4D A2 08 20 C9 FF A9 3F
2129:01 20 D2 FF A9 1C 20 D2 1F
2131:FF A9 00 8D 3C 18 A9 13 5F
2139:8D 3D 18 AD 3C 18 20 D2 C4
2141:FF EE 3C 18 D0 03 EE 3D F5
2149:18 AD 3D 18 C9 1B D0 EB 74
2151:AD 3C 18 C9 8B D0 E4 A2 25
2159:03 A9 FD 86 FC 85 FB A9 4F
2161:FB A2 01 A0 00 20 74 FF DD
2169:20 57 1B 20 D2 FF E6 FB 57
2171:D0 02 E6 FC A5 FC CD D7 DD
2179:13 D0 E4 A5 FB CD D6 13 48
2181:D0 DD A9 08 20 C3 FF 20 89
2189:CC FF 4C C3 4D A0 52 20 A9
2191:C3 17 90 03 4C C3 4D 20 E9
2199:F9 18 90 03 4C C3 4D 20 4D
21A1:CF FF 20 CF FF 8D FF 03 06
21A9:A9 04 A2 00 8E D4 13 86 8A
21B1:FB 85 FC 20 CF FF AA A5 6E
21B9:90 8D D4 13 8A A2 FB 8E D8
21C1:B9 02 A0 00 A2 01 20 77 46
21C9:FF E6 FB D0 02 E6 FC AD A5
21D1:D4 13 F0 DF 20 CC FF A9 3D
21D9:08 20 C3 FF 4C 0A 14 20 73
21E1:17 FA 46 49 4C 45 4E 41 21
21E9:4D 45 20 52 45 51 55 49 B0
21F1:52 45 44 8D 00 20 B1 14 08
21F9:60 A2 08 20 C6 FF 20 CF 5E
2201:FF A5 90 F0 05 20 47 19 20
2209:38 60 A9 12 85 FE A9 FE 52
2211:85 FD 20 CF FF E6 FD D0 01
2219:02 E6 FE A9 8B C5 FD D0 D2
2221:F1 A9 1B C5 FE D0 EB 18 B3
2229:60 A9 04 85 FC A9 00 85 F4
2231:FB 20 CF FF E6 FB D0 02 40
2239:E6 FC A9 10 C5 FB D0 F1 18
2241:A9 09 C5 FC D0 EB 60 20 3C
2249:17 FA 46 49 4C 45 20 45 32
2251:52 52 4F 52 8D 00 A9 08 2A
2259:20 C3 FF 20 CC FF 20 B1 F8
2261:14 60 20 17 FA 4D 45 4D 22
2269:4F 52 59 20 46 55 4C 4C 83
2271:20 4E 4F 57 2E 8D 00 20 80
2279:B1 14 4C 0A 14 AD FF 03 20
2281:C9 32 F0 DE A0 52 20 C3 95
2289:17 90 03 4C C3 4D 20 F9 30
2291:18 90 03 4C C3 4D 20 CF 8E
2299:FF 20 CF FF 8D D8 13 20 F5
22A1:29 19 A9 00 8D B0 19 A9 01
22A9:0C 8D B1 19 20 CF FF 8D EC
22B1:F4 0D EE B0 19 D0 03 EE 9D
22B9:B1 19 AD B1 19 C9 0D D0 C8
22C1:EB AD B0 19 C9 F4 D0 E4 B7
22C9:A9 00 8D DB 19 A9 0C 8D 67
22D1:DC 19 20 26 16 A2 00 20 8C
22D9:35 16 BD 00 0C 9D AF 1A 46
22E1:20 35 16 E8 E0 08 D0 F2 90
22E9:A9 00 20 35 16 20 CD 14 3B
22F1:20 AC 1A AD FE 03 F0 17 8C
22F9:20 17 FA 44 55 50 45 20 4E
2301:4E 41 4D 45 8D 00 20 CF 39
2309:FF AA D0 FA 4C 62 1A 20 04
2311:1A 16 20 26 16 20 CF FF 21
2319:C9 8D F0 06 20 35 16 4C 74
2321:15 1A A9 00 20 35 16 20 CF
2329:74 14 AD FE 03 10 03 4C FE
2331:A1 1A 20 26 16 20 CF FF 06
2339:A8 D0 E1 20 17 FA 4B 45 C6
2341:45 50 20 28 59 2F 4E 29 12
2349:3F 00 A2 00 20 C6 FF 20 BF
2351:E4 FF C9 59 F0 14 C9 4E 92
2359:D0 F5 20 D2 16 A2 08 20 22
2361:C6 FF CE D8 13 D0 0C 4C B2
2369:96 1A 20 D2 16 20 47 16 88
2371:4C 62 1A AD FF 03 C9 32 66
2379:F0 27 AD DB 19 18 69 0A 7B
2381:8D DB 19 A9 00 6D DC 19 CB
2389:8D DC 19 20 26 16 A2 00 C1
2391:20 35 16 4C DA 19 A9 08 53
2399:20 C3 FF 20 CC FF 4C 0A EB
23A1:14 A9 08 20 C3 FF 20 CC 8A
23A9:FF 4C 62 19 20 17 FA 48 7C
23B1:45 4C 50 20 20 20 20 2D A8
23B9:00 60 A9 20 8D D7 13 20 61
23C1:A8 17 C9 38 D0 0B 8D D6 83
23C9:13 A9 08 8D D4 13 4C 25 8E
23D1:1B C9 39 D0 0B 8D D6 13 9B
23D9:A9 09 8D D4 13 4C 25 1B 65
23E1:C9 31 F0 20 20 17 FA 49 16
23E9:4C 4C 45 47 41 4C 20 44 46
23F1:45 56 49 43 45 20 4E 55 6A
23F9:4D 42 45 52 8D 00 20 B1 A3
2401:14 4C C3 4D 8D D6 13 20 C1
2409:A8 17 C9 30 D0 0B 8D D7 4D
2411:13 A9 0A 8D D4 13 4C 25 18
2419:1B C9 31 D0 C7 8D D7 13 CB
2421:A9 0B 8D D4 13 20 A8 17 81
2429:D0 BA AD D4 13 8D D5 13 19
2431:20 17 FA 44 49 53 4B 20 41
2439:44 52 49 56 45 20 49 53 57
2441:20 23 00 AD D6 13 20 D2 53
2449:FF AD D7 13 20 D2 FF A9 1F
2451:8D 20 D2 FF 4C C3 4D 8D 5C
2459:D4 13 A5 FC C9 04 D0 16 6B
2461:A5 FB D0 07 AD D4 13 8D 7A
2469:D6 13 60 C9 01 D0 18 AD B3
2471:D4 13 8D D7 13 60 C9 03 C8
2479:D0 0D A5 FB C9 FF D0 07 D8
2481:AD D4 13 8D D8 13 60 AD 92
2489:D4 13 60 00 00 04 BB 0D A1
2491:00 30 20 47 45 54 41 24 80
2499:3A 49 46 41 24 3D 22 22 AA
24A1:54 48 45 4E 5C 31 30 8D 49
24A9:00 4E 54 49 4E 55 45 2E 25
24B1:8D 00 4C 2E 20 31 8D 00 0E
24B9:00 00 00 00 00 00 FF FF 02
24C1:FF FF FF FF FF FF FF FF 0A
24C9:FF FF FF FF FF FF FF FF 12
24D1:FF FF FF FF FF FF FF FF 1A
24D9:FF FF FF FF FF FF 00 00 22
24E1:00 00 00 00 00 00 00 00 2A
24E9:00 00 00 00 00 00 FF FF 32
24F1:FF FF FF FF FF FF FF FF 3A
24F9:FF FF FF FF FF FF 00 00 42
2501:00 00 00 00 00 00 00 00 4B
2509:00 00 00 00 00 00 00 00 53
2511:00 00 00 00 00 00 00 00 5B
2519:00 00 00 00 00 00 FF FF 63
2521:FF FF FF FF FF FF FF FF 6B
2529:FF FF FF FF FF FF 00 00 73
2531:00 00 00 00 00 00 00 00 7B
2539:00 00 00 00 00 00 FF FF 83
2541:FF FF FF FF FF FF FF FF 8B
2549:FF FF FF FF FF FF 3A 00 08
2551:00 00 F0 2F 00 00 00 00 AC
2559:00 0D 57 41 49 54 20 20 E1
2561:20 20 00 00 08 00 00 00 04
2569:00 00 10 27 E8 03 64 00 44
2571:0A 00 01 00 AD FE 03 D0 21
2579:0C AD FF 03 8D FE 03 20 F3
2581:5E 07 20 47 07 A9 10 8D C1
2589:CB 04 A2 08 20 52 07 20 08
2591:69 07 CA D0 F7 CE FE 03 B4
2599:F0 0B 20 52 07 20 52 07 AC
25A1:CE CB 04 D0 0B A9 8D 20 0E
25A9:69 07 A9 00 20 69 07 60 B4
25B1:A9 20 20 69 07 A9 20 20 B2
25B9:69 07 4C FC 04 A2 08 A9 38
25C1:20 9D CB 04 CA D0 FA 20 EC
25C9:75 07 F0 0C B0 0A E0 08 E6
25D1:F0 0A 9D CC 04 E8 D0 EF EC
25D9:E0 00 D0 06 A9 FF 8D FE 76
25E1:03 60 A9 10 8D 95 07 A9 76
25E9:09 8D 96 07 A9 00 8D FE C6
25F1:03 CD FF 03 D0 01 60 A2 4F
25F9:00 EE FE 03 20 94 07 DD 4F
2601:CC 04 D0 06 E8 E0 08 D0 DA
2609:F3 60 A9 0A 18 6D 95 07 E5
2611:8D 95 07 A9 00 6D 96 07 EE
2619:8D 96 07 AD FE 03 CD FF 2D
2621:03 90 D4 A9 00 8D FE 03 7F
2629:60 A2 00 8E D5 04 A9 00 49
2631:8D D7 04 AD D8 04 38 FD DA
2639:DC 04 8D DA 04 AD D9 04 E2
2641:FD DD 04 90 0F EE D7 04 75
2649:8D D9 04 AD DA 04 8D D8 09
2651:04 4C A5 05 AD D7 04 D0 5D
2659:09 E0 08 F0 05 AC D5 04 FC
2661:F0 0E 18 69 30 8D D5 04 AA
2669:20 69 07 E0 08 D0 01 60 F4
2671:E8 E8 4C A0 05 A2 08 8E 51
2679:D6 04 20 94 07 8D 53 07 9B
2681:8D 6A 07 8E FE 03 E8 20 EE
2689:94 07 8D 6B 07 8D 54 07 68
2691:60 AD 00 04 8D 6A 07 AD 8B
2699:01 04 8D 6B 07 60 A9 00 DC
26A1:20 69 07 AD 95 07 8D 91 89
26A9:07 AD 96 07 8D 92 07 A2 8F
26B1:09 AD 01 04 20 90 07 CA 6A
26B9:AD 00 04 20 90 07 AD 6B C6
```

```
26C1:07 8D 01 04 AD 6A 07 8D 08
26C9:00 04 CA BD CC 04 20 90 93
26D1:07 E0 00 D0 F5 8E FD 03 CF
26D9:60 20 69 07 A2 04 EC 6B 66
26E1:07 D0 09 A2 C4 EC 6A 07 E6
26E9:D0 02 38 60 18 60 20 7B 2A
26F1:07 F0 11 20 4B 06 B0 06 FB
26F9:20 75 07 4C 63 06 A9 FF DF
2701:8D FE 03 60 A9 8D 20 4B 4B
2709:06 B0 F3 60 AD FF 03 C9 48
2711:01 D0 0E A9 04 8D 00 04 CA
2719:A9 0B 8D 01 04 CE FF 03 1F
2721:60 CD FE 03 D0 12 A2 08 3F
2729:20 94 07 8D 00 04 E8 20 68
2731:94 07 8D 01 04 4C 8F 06 C3
2739:A2 08 20 94 07 8D 6A 07 72
2741:E8 20 94 07 8D 6B 07 A2 D9
2749:12 20 94 07 8D 53 07 E8 5C
2751:20 94 07 8D 54 07 20 52 DF
2759:07 20 69 07 AD 53 07 CD 67
2761:00 04 D0 F2 AD 54 07 CD 94
2769:01 04 D0 EA AD 6A 07 8D B4
2771:00 04 AD 6B 07 8D 01 04 A1
2779:AD 53 07 38 ED 6A 07 8D 8C
2781:C0 04 AD 54 07 ED 6B 07 F9
2789:8D C1 04 AD FF 03 38 ED D4
2791:FE 03 8D FE 03 AD 95 07 C2
2799:8D 91 07 18 69 0A 8D 95 99
27A1:07 AD 96 07 8D 92 07 69 50
27A9:00 8D 96 07 A2 00 20 94 88
27B1:07 20 90 07 E8 E0 08 D0 B9
27B9:F5 20 94 07 38 ED C0 04 0D
27C1:20 90 07 E8 20 94 07 ED 03
27C9:C1 04 20 90 07 CE FE 03 7B
27D1:D0 C3 4C 8F 06 A9 10 8D 80
27D9:53 07 A9 09 8D 54 07 60 85
27E1:AD B6 0D EE 53 07 D0 03 A0
27E9:EE 54 07 60 A9 02 8D 6A 86
27F1:07 A9 04 8D 6B 07 60 8D 4D
27F9:BB 0D EE 6A 07 D0 03 EE 5E
2801:6B 07 60 E6 3D D0 02 E6 5B
2809:3E A0 00 B1 3D 8D 98 07 14
2811:C9 5C F0 05 18 AD 98 07 7B
2819:60 38 AD 98 07 60 9D 2E 0A
2821:09 60 BD 2E 09 60 00 C9 3C
2829:30 90 03 C9 3A 60 38 60 D6
2831:A9 00 8D D4 04 20 7B 07 F3
2839:C9 5C F0 01 60 8D D4 04 9A
2841:A9 00 8D C6 04 8D C7 04 6E
2849:20 75 07 20 99 07 B0 06 3A
2851:20 D5 07 4C BA 07 AE C6 E2
2859:04 8E D8 04 AE C7 04 8E D5
2861:D9 04 60 38 E9 30 8D CA 25
2869:04 AD C6 04 8D C8 04 AD 85
2871:C7 04 8D C9 04 20 18 08 CD
2879:AE C8 04 AC C9 04 20 18 55
2881:08 20 18 08 8A 18 6D C8 B9
2889:04 8D C6 04 98 6D C9 04 6A
2891:8D C7 04 AD CA 04 18 6D F9
2899:C6 04 8D C6 04 A9 00 6D A0
28A1:C7 04 8D C7 04 60 0E C8 8B
28A9:04 2E C9 04 60 20 52 07 30
28B1:20 99 07 B0 1B 38 E9 30 22
28B9:8D C6 04 A9 00 8D C7 04 67
28C1:20 52 07 20 99 07 B0 06 E9
28C9:20 D5 07 4C 32 08 18 60 87
28D1:38 60 20 5E 07 AD D4 04 DC
28D9:D0 03 4C E0 08 20 1F 08 F1
28E1:A8 8C C2 04 F0 5B 90 0B 63
28E9:A9 00 8D D4 04 AD C2 04 6E
28F1:4C FB 08 AD D6 04 D0 16 C1
28F9:AD C6 04 18 6D C0 04 8D D8
2901:D8 04 AD C7 04 6D C1 04 50
2909:8D D9 04 4C 98 08 A9 00 16
2911:8D D6 04 AD D8 04 38 ED 70
2919:C6 04 8D C0 04 AD D9 04 1C
2921:ED C7 04 8D C1 04 20 9B AF
2929:05 AD C2 04 C9 5C F0 1E C1
2931:C9 8D F0 11 C9 00 F0 09 34
2939:20 69 07 20 52 07 4C 9E BE
2941:08 8D FE 03 60 20 69 07 68
2949:A9 00 20 69 07 60 AD D4 F4
2951:04 D0 05 A9 5C 4C AA 08 86
2959:20 1F 08 A8 8C C2 04 F0 77
2961:E0 90 95 A9 5C 20 69 07 D2
2969:AD C2 04 4C 6A 08 20 52 8E
2971:07 C9 5C D0 14 AE FD 03 AC
2979:10 0F 20 52 07 20 99 07 B3
2981:90 07 A8 A9 5C 20 69 07 CA
2989:98 20 69 07 C9 00 D0 04 C1
2991:8D FE 03 60 C9 8D D0 D6 CD
2999:A9 00 20 69 07 60 42 49 E2
29A1:54 53 20 20 20 20 04 0B 8D
29A9:48 45 4C 50 20 20 20 20 E1
29B1:A2 0B 43 4F 4C 4F 52 20 D9
29B9:20 20 60 0D 57 41 49 54 A7
29C1:20 20 20 20 7C 0D FF FF 4A
29C9:FF FF FF FF FF FF FF FF 1C
29D1:FF FF FF FF FF FF FF FF 24
29D9:FF FF FF FF FF FF 00 00 2C
29E1:00 00 00 00 00 00 00 00 34
29E9:00 00 00 00 00 00 FF FF 3C
29F1:FF FF FF FF FF FF FF FF 44
29F9:FF FF FF FF FF FF 00 00 4C
2A01:00 00 00 00 00 00 00 00 55
2A09:00 00 00 00 00 00 00 00 5D
2A11:00 00 00 00 00 00 00 00 65
2A19:00 00 00 00 00 00 FF FF 6D
2A21:FF FF FF FF FF FF FF FF 75
2A29:FF FF FF FF FF FF 00 00 7D
2A31:00 00 00 00 00 00 00 00 85
2A39:00 00 00 00 00 00 FF FF 8D
2A41:FF FF FF FF FF FF FF FF 95
2A49:FF FF FF FF FF FF FF FF 9D
2A51:FF FF FF FF FF FF FF FF A5
2A59:FF FF FF FF FF FF 00 00 AD
2A61:00 00 00 00 00 00 00 00 B5
2A69:00 00 00 00 00 00 FF FF BD
2A71:FF FF FF FF FF FF FF FF C5
2A79:FF FF FF FF FF FF 00 00 CD
2A81:00 00 00 00 00 00 00 00 D5
2A89:00 00 00 00 00 00 00 00 DD
2A91:00 00 00 00 00 00 00 00 E5
2A99:00 00 00 00 00 00 FF FF ED
2AA1:FF FF FF FF FF FF FF FF F5
2AA9:FF FF FF FF FF FF 00 00 FD
2AB1:00 00 00 00 00 00 00 00 06
2AB9:00 00 00 00 00 00 FF FF 0E
2AC1:FF FF FF FF FF FF FF FF 16
2AC9:FF FF FF FF FF FF FF FF 1E
2AD1:FF FF FF FF FF FF FF FF 26
2AD9:FF FF FF FF FF FF 00 00 2E
2AE1:00 00 00 00 00 00 00 00 36
2AE9:00 00 00 00 00 00 FF FF 3E
2AF1:FF FF FF FF FF FF FF FF 46
2AF9:FF FF FF FF FF FF 00 00 4E
2B01:00 00 00 00 00 00 00 00 57
2B09:00 00 00 00 00 00 00 00 5F
2B11:00 00 00 00 00 00 00 00 67
2B19:00 00 00 00 00 00 FF FF 6F
2B21:FF FF FF FF FF FF FF FF 77
2B29:FF FF FF FF FF FF 00 00 7F
2B31:00 00 00 00 00 00 00 00 87
2B39:00 00 00 00 00 00 FF FF 8F
2B41:FF FF FF FF FF FF FF FF 97
2B49:FF FF FF FF FF FF FF FF 9F
2B51:FF FF FF FF FF FF FF FF A7
2B59:FF FF FF FF FF FF 00 00 AF
2B61:00 00 00 00 00 00 00 00 B7
2B69:00 00 00 00 00 00 FF FF BF
2B71:FF FF FF FF FF FF FF FF C7
2B79:FF FF FF FF FF FF 00 00 CF
2B81:00 00 00 00 00 00 00 00 D7
2B89:00 00 00 00 00 00 00 00 DF
2B91:00 00 31 30 30 20 44 49 E4
2B99:4D 42 49 28 37 29 2C 42 CB
2BA1:4F 28 37 29 8D 31 31 30 E6
2BA9:20 46 4F 52 49 3D 30 54 A4
2BB1:4F 37 3A 42 49 28 49 29 8F
2BB9:3D 32 5E 49 8D 31 32 30 61
2BC1:20 42 4F 28 49 29 3D 32 C0
2BC9:35 35 2D 42 49 28 49 29 78
2BD1:3A 4E 45 58 54 8D 31 33 75
2BD9:30 20 52 45 4D 20 53 45 C5
2BE1:54 20 42 49 54 20 4E 55 5C
2BE9:4D 42 45 52 20 49 4E 20 28
2BF1:4E 8D 31 34 30 20 44 45 0C
2BF9:46 46 4E 42 53 28 58 29 08
2C01:3D 50 45 45 4B 28 58 29 DD
2C09:4F 52 42 49 28 4E 29 8D D4
2C11:31 35 30 20 44 45 46 46 61
2C19:4E 42 43 28 58 29 3D 50 46
2C21:45 45 4B 28 58 29 41 4E 91
2C29:44 42 4F 28 4E 29 8D 00 D2
2C31:20 20 20 20 20 20 20 20 89
2C39:20 4D 41 43 52 4F 20 42 A3
2C41:41 53 49 43 20 31 32 38 CE
2C49:20 43 4F 4D 4D 41 4E 44 91
2C51:53 8D 20 8D 20 5C 20 20 66
2C59:20 20 20 20 20 4C 49 53 E7
2C61:54 20 41 4C 4C 20 4D 41 97
2C69:43 52 4F 53 8D 20 5E 4E 0F
2C71:4D 20 20 20 20 20 44 49 D1
2C79:53 50 4C 41 59 20 4D 41 54
2C81:43 52 4F 20 27 4E 4D 27 30
2C89:8D 20 5F 4E 4D 20 20 20 CC
2C91:20 20 45 58 45 43 55 54 66
2C99:45 20 4D 41 43 52 4F 20 7C
2CA1:27 4E 4D 27 8D 20 5F 4E 37
2CA9:4D 5C 32 30 30 20 49 4E EB
2CB1:53 45 52 54 20 4D 41 43 90
2CB9:52 4F 20 27 4E 4D 27 20 9B
2CC1:41 54 20 4C 49 4E 45 20 C6
2CC9:32 30 30 8D 20 3D 4E 4D 06
2CD1:20 20 20 20 20 43 52 45 40
2CD9:41 54 45 2F 44 45 4C 45 98
2CE1:54 45 20 4D 41 43 52 4F 99
2CE9:20 27 4E 4D 27 8D 20 3D A7
2CF1:20 20 20 20 20 20 20 45 6F
2CF9:4E 44 20 4D 41 43 52 4F 6E
2D01:20 43 52 45 41 54 49 4F 18
2D09:4E 8D 20 24 20 20 20 20 16
2D11:20 20 20 44 49 53 50 4C 50
2D19:41 59 20 44 49 53 4B 20 01
2D21:44 49 52 45 43 54 4F 52 EA
2D29:59 8D 20 40 20 20 20 20 7D
2D31:20 20 20 53 45 4E 44 20 E8
2D39:44 49 53 4B 20 43 4F 4D 21
2D41:4D 41 4E 44 8D 20 2A 4C 2E
2D49:49 42 20 20 20 20 53 41 48
2D51:56 45 20 4C 49 42 52 41 2A
2D59:52 59 20 27 4C 49 42 27 DC
2D61:8D 20 2B 4C 49 42 20 20 68
2D69:20 20 4C 4F 41 44 20 4C 02
2D71:49 42 52 41 52 59 20 27 BE
2D79:4C 49 42 27 8D 20 FF 4C 40
2D81:49 42 20 20 20 20 41 44 5F
2D89:44 20 4D 41 43 52 4F 53 21
2D91:20 46 52 4F 4D 20 4C 49 99
2D99:42 52 41 52 59 20 27 4C DC
2DA1:49 42 27 8D 20 23 39 20 0F
2DA9:20 20 20 20 20 53 57 49 68
2DB1:54 43 48 20 54 4F 20 44 76
2DB9:49 53 4B 20 44 52 49 56 4D
2DC1:45 20 39 8D 20 8D 4E 4F E9
2DC9:54 45 20 54 48 41 54 20 F8
2DD1:41 4C 4C 20 43 4F 4D 4D AA
2DD9:41 4E 44 53 20 53 54 41 5E
2DE1:52 54 20 49 4E 20 43 4F DB
2DE9:4C 2E 20 31 8D 00 43 4F 4F
2DF1:4C 4F 52 30 2C 31 8D 43 18
2DF9:4F 4C 4F 52 34 2C 31 8D 60
2E01:43 4F 4C 4F 52 35 2C 37 48
2E09:8D 00 35 20 50 52 49 4E 81
2E11:54 22 50 52 45 53 53 20 8D
2E19:41 4E 59 20 4B 45 59 20 19
2E21:54 4F 20 43 4F 4E 54 49 59
2E29:4E 55 45 2E 22 8D 31 30 67
2E31:20 47 45 54 4B 59 24 3A 9F
2E39:49 46 4B 59 24 3D 22 22 47
2E41:54 48 45 4E 5C 31 30 8D FC
2E49:00 00 00 00 00 00 00 00 A5
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How To Type In *COMPUTE!'s Gazette* Programs

Each month, COMPUTE!'s Gazette publishes programs for the Commodore 128, 64, Plus/4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then on, erasing what was in memory. So be sure to *save a program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the *Gazette*, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [ ], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode.*

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it. **G**

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ←CRSR→	
{RIGHT}	←CRSR→	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↑	

For Commodore 64 Only

[1]	COMMODORE + 1	
[2]	COMMODORE + 2	
[3]	COMMODORE + 3	
[4]	COMMODORE + 4	
[5]	COMMODORE + 5	
[6]	COMMODORE + 6	
[7]	COMMODORE + 7	
[8]	COMMODORE + 8	

NEW! ACTION REPLAY v5.0

THE ULTIMATE UTILITY / BACKUP CARTRIDGE FOR THE C64/128

• Action Replay allows you to Freeze the action of any Memory Resident Program and make a complete back-up to disk - and that's not all .... Just compare these features

SUPER CRUNCHER — ONLY $9.99

- A utility to turn your Action Replay 5 into a super powerful program compactor. Reduce programs by up to 50%! Further compact programs already cruched by AR5's compactor.

GRAPHICS SUPPORT DISK — ONLY $19.99

To take advantage of AR5's unique power, we have prepared a suite of graphic support facilities.

- SCREEN VIEWER: View screens in a 'slide show' sequence.
- MESSAGE MAKER: Add scrolling messages to your saved screens with music.
- PROSPRITE: A full sprite editor.
- ZOOM LENS: Explode sections of any saved screen to full size.

WARP 25

The world's fastest disk serial Turbo. A typical backup will reload in under 5 seconds.

- No special formats — with action replay you simply save directly into Warp 25 status.
- Backup all your existing programs to load at unbelievable speed!
- Warp Save/Load Available straight from Basic.

RAMLOADER

- You can also load load most of your commercial originals 25 times faster! With our special LSI logic processor and 8K of onboard Ram, Action Replay offers the world's fastest Disk Serial Turbo.

UNIQUE CODE CRACKER MONITOR

- Freeze any program and enter a full machine code monitor.
- Full Monitor Features.
- Because of Action Replay's on Board Ram the program can be looked at in its ENTIRETY. That means you see the code in its Frozen state not in a Reset state as with competitors products.

MORE UNIQUE FEATURES

- Simple Operation: Just press the button at any point and make a complete back-up of any* memory-resident program to tape or disk.
- Turbo Reload: All back-ups reload completely independent of the cartridge at Turbo speed.
- Sprite Monitor: View the Sprite set from the frozen program — save the Sprite — transfer the Sprite from one game to another. Wipe out Sprites, view the animation on screen. Create custom programs.
- Sprite Killer: Effective on most programs — make yourself invincible. Disable Sprite/Sprite/Background collisions.
- Unique Picture Save: Freeze and save any Hires Screen to tape or disk. Saved in Koala, Blazing paddles format.
- Compactor: Efficient compacting techniques — 3 programs per disk — 6 if you use both sides.
- Single File: All programs saved as a single file for maximum compatibility.
- Utility Commands: Many additional commands: Autonum, Append, Old, Delete, Linesaver, etc.
- Screen Dump: Print out any screen in 16 Gray Scales, Double size print options.
- Unstoppable Reset: Reset button to Retrieve System and Reset even so called Unstoppable Programs.
- Fully Compatible: Works with 1541/C/II, 1581, 1571 and with C64, 128, or 128D (in 64 Mode).
- Disk Utilities: Fast Format, Directory, List, Run and many other key commands are operated by Function Keys.
- Unique Restart: Remember all of these utilities are available at one time from an intergrated operating system. A running program can be Frozen to enter any Utility and the program is restarted at the touch of a key — without corruption.
- LSI Logic Processor: This is where Action Replay V gets its power. A special custom LSI chip designed to process the logic necessary for this unmatched Freeze/Restart power. No other cartridge has this power!

UPGRADE ROM — ONLY $16.99

- Give your AR IV all the power of the new V5.0.

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- Burst Nibbler is actually a two-part system — a software package and a parallel cable to connect the 1541/1571 to 64/128 (state type).
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256K SUPEROM EXPANDER Only $49.99

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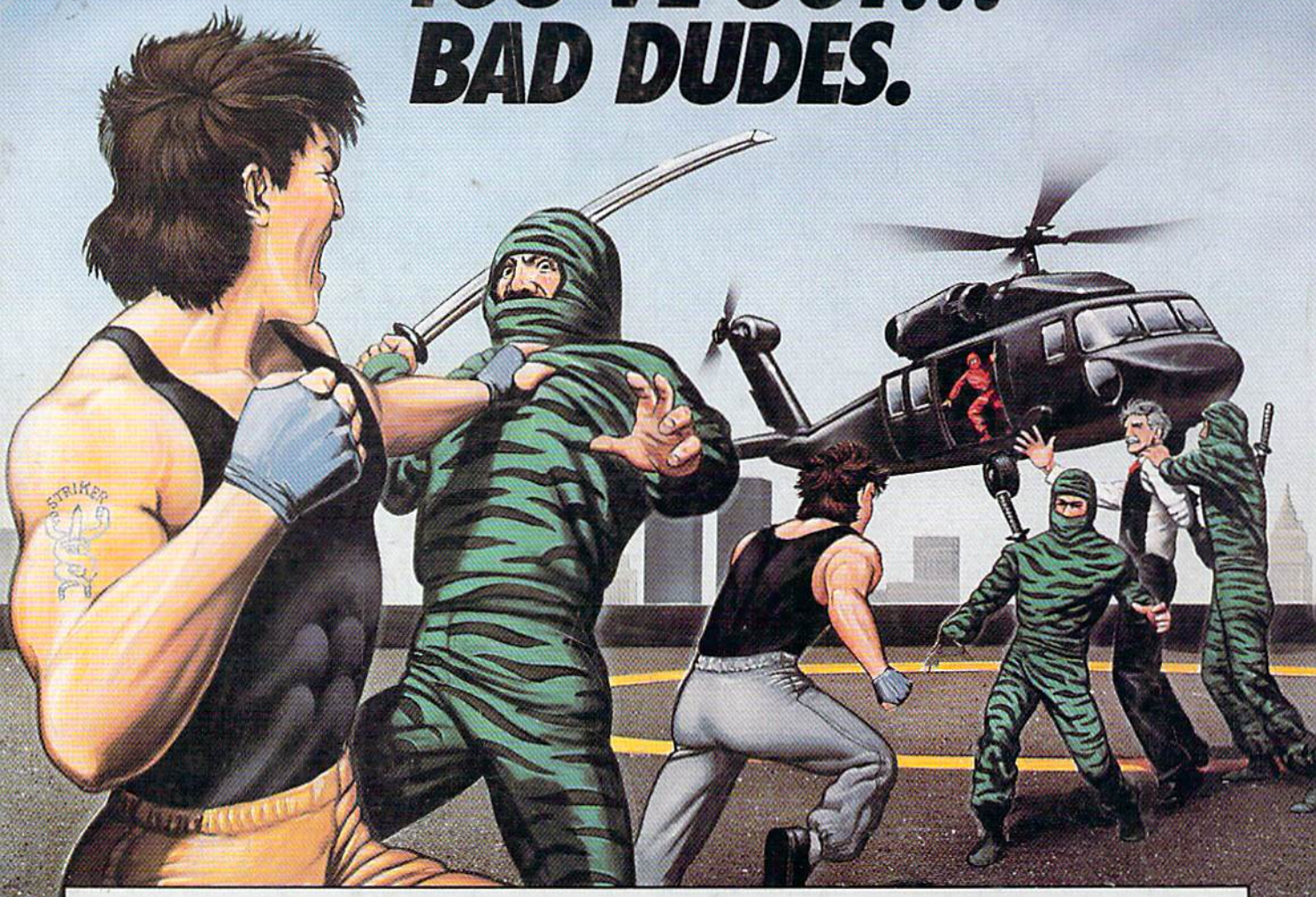

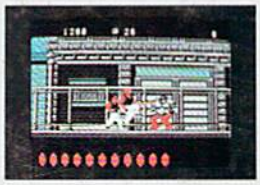

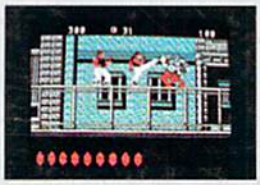

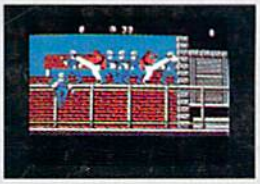

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